



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 05:13 AM EDT

PDB ID : 6NLK  
Title : 1.85 Å resolution structure of WT BfrB from *Pseudomonas aeruginosa* in complex with a protein-protein interaction inhibitor (analog 13)  
Authors : Lovell, S.; Punchi-Hewage, A.; Battaile, K.P.; Yao, H.; Nammalwar, B.; Gnanasekaran, K.K.; Bunce, R.A.; Reitz, A.B.; Rivera, M.  
Deposited on : 2019-01-08  
Resolution : 1.85 Å (reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.36.2  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

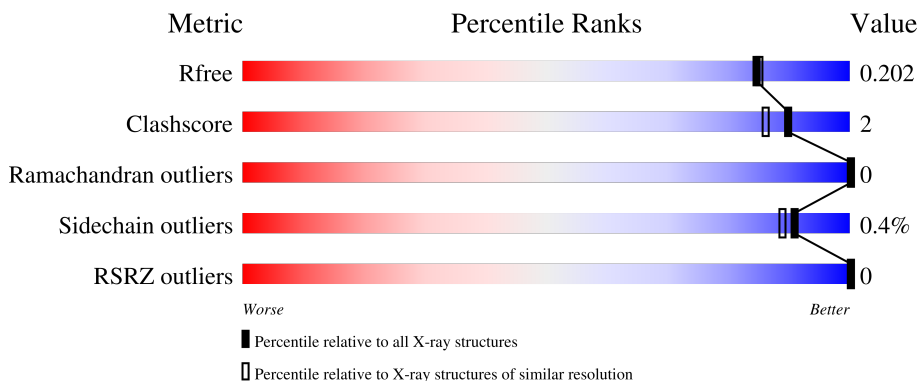
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.85 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	158	93% 5% ..
1	B	158	96% ..
1	C	158	97% ..
1	D	158	97% ..

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Mol	Chain	Length	Quality of chain
1	E	158	 94% 5% . .
1	F	158	 94% 5% . .
1	G	158	 94% 5% . .
1	H	158	 96% . .
1	I	158	 96% . .
1	J	158	 96% . .
1	K	158	 92% 6% . .
1	L	158	 96% . .

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 17552 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Ferroxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	156	1278	809	218	244	7	0	2	0
1	B	156	1275	807	217	244	7	0	2	0
1	C	156	1267	802	216	242	7	0	2	0
1	D	156	1277	807	217	246	7	0	2	0
1	E	156	1280	811	218	244	7	0	3	0
1	F	156	1267	804	216	240	7	0	2	0
1	G	156	1272	806	216	243	7	0	2	0
1	H	156	1274	808	217	242	7	0	3	0
1	I	156	1270	805	215	243	7	0	2	0
1	J	156	1274	806	217	244	7	0	2	0
1	K	156	1277	809	218	243	7	0	2	0
1	L	156	1280	811	218	244	7	0	3	0

- Molecule 2 is FE (II) ION (three-letter code: FE2) (formula: Fe).

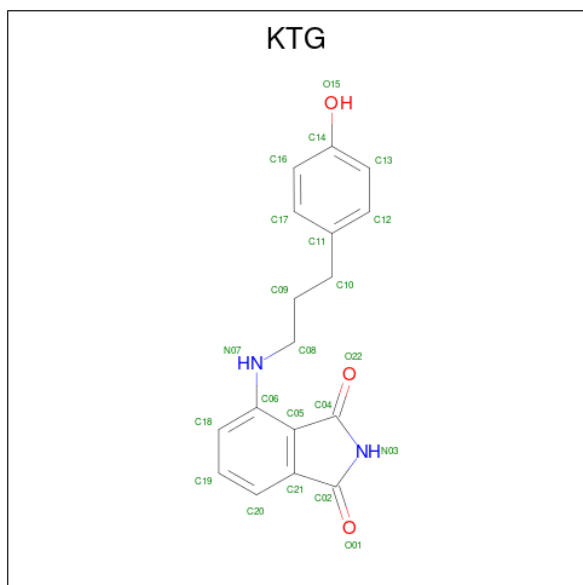
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Fe	0	0
			1	1		
2	B	1	Total	Fe	0	0
			1	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	D	1	Total Fe 1 1	0	0

- Molecule 3 is 4-{{[3-(4-hydroxyphenyl)propyl]amino}-1H-isoindole-1,3(2H)-dione (three-letter code: KTG) (formula: C<sub>17</sub>H<sub>16</sub>N<sub>2</sub>O<sub>3</sub>).



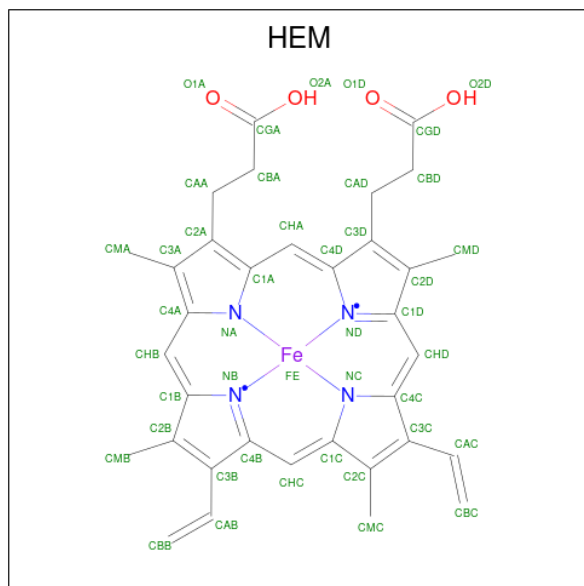
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O 13 9 2 2	0	0
3	B	1	Total C N O 22 17 2 3	0	0
3	C	1	Total C N O 22 17 2 3	0	0
3	D	1	Total C N O 13 9 2 2	0	0
3	E	1	Total C N O 22 17 2 3	0	0
3	F	1	Total C N O 22 17 2 3	0	0
3	G	1	Total C N O 22 17 2 3	0	0
3	H	1	Total C N O 15 11 2 2	0	0
3	I	1	Total C N O 22 17 2 3	0	0
3	J	1	Total C N O 22 17 2 3	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	K	1	Total	C	N	O	0	0
			22	17	2	3		
3	L	1	Total	C	N	O	0	0
			22	17	2	3		

- Molecule 4 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
4	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	E	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	F	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	H	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
4	L	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 5 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula:  $C_8H_{18}O_5$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 13 8 5	0	0
5	A	1	Total C O 13 8 5	0	0
5	C	1	Total C O 11 7 4	0	0
5	C	1	Total C O 10 6 4	0	0
5	D	1	Total C O 13 8 5	0	0
5	D	1	Total C O 10 6 4	0	0
5	E	1	Total C O 13 8 5	0	0
5	E	1	Total C O 8 5 3	0	0
5	G	1	Total C O 13 8 5	0	0
5	H	1	Total C O 13 8 5	0	0
5	H	1	Total C O 8 5 3	0	0
5	I	1	Total C O 13 8 5	0	0
5	I	1	Total C O 8 5 3	0	0
5	J	1	Total C O 13 8 5	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	J	1	Total	C	O	0	0
			13	8	5		
5	K	1	Total	C	O	0	0
			13	8	5		
5	L	1	Total	C	O	0	0
			13	8	5		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	124	Total	O	0	0
			124	124		
6	B	135	Total	O	0	0
			135	135		
6	C	144	Total	O	0	0
			144	144		
6	D	109	Total	O	0	0
			109	109		
6	E	156	Total	O	0	0
			156	156		
6	F	133	Total	O	0	0
			133	133		
6	G	115	Total	O	0	0
			115	115		
6	H	122	Total	O	0	0
			122	122		
6	I	104	Total	O	0	0
			104	104		
6	J	127	Total	O	0	0
			127	127		
6	K	133	Total	O	0	0
			133	133		
6	L	118	Total	O	0	0
			118	118		



### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Ferroxidase

Chain A:  93% 5% ..



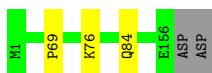
- Molecule 1: Ferroxidase

Chain B:  96% ..



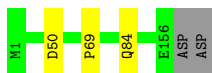
- Molecule 1: Ferroxidase

Chain C:  97% ..



- Molecule 1: Ferroxidase

Chain D:  97% ..



- Molecule 1: Ferroxidase

Chain E:  94% 5% ..



- Molecule 1: Ferroxidase

Chain F:  94% 5% ..



- Molecule 1: Ferroxidase

Chain G: 94% 5%



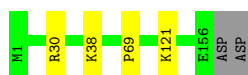
- Molecule 1: Ferroxidase

Chain H: 96% ..



- Molecule 1: Ferroxidase

Chain I: 96% ..



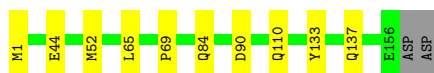
- Molecule 1: Ferroxidase

Chain J: 96% ..



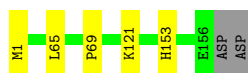
- Molecule 1: Ferroxidase

Chain K: 92% 6%



- Molecule 1: Ferroxidase

Chain L: 96% ..



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	129.81Å 194.56Å 203.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.31 – 1.85 48.64 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.31-1.85) 99.6 (48.64-1.85)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.30 (at 1.86Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.162 , 0.195 0.172 , 0.202	Depositor DCC
$R_{free}$ test set	10820 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.8	Xtrriage
Anisotropy	0.571	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 53.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	17552	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.77% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, FE2, PG4, KTG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.45	0/1305	0.56	0/1758
1	B	0.43	0/1302	0.54	0/1755
1	C	0.45	0/1294	0.57	0/1746
1	D	0.42	0/1304	0.54	0/1758
1	E	0.54	0/1310	0.56	0/1765
1	F	0.45	0/1294	0.54	0/1745
1	G	0.46	0/1299	0.54	0/1751
1	H	0.42	0/1304	0.52	0/1758
1	I	0.49	0/1297	0.56	1/1749 (0.1%)
1	J	0.49	0/1301	0.56	0/1754
1	K	0.45	0/1304	0.56	0/1756
1	L	0.41	0/1310	0.51	0/1765
All	All	0.46	0/15624	0.55	1/21060 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	30	ARG	NE-CZ-NH2	-5.17	117.72	120.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1278	0	1256	7	0
1	B	1275	0	1247	3	0
1	C	1267	0	1232	3	0
1	D	1277	0	1247	2	0
1	E	1280	0	1258	6	0
1	F	1267	0	1236	5	0
1	G	1272	0	1243	5	0
1	H	1274	0	1247	3	0
1	I	1270	0	1236	2	0
1	J	1274	0	1245	2	0
1	K	1277	0	1259	7	0
1	L	1280	0	1258	3	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	D	1	0	0	0	0
3	A	13	0	0	1	0
3	B	22	0	0	1	0
3	C	22	0	0	1	0
3	D	13	0	0	1	0
3	E	22	0	0	1	0
3	F	22	0	0	1	0
3	G	22	0	0	1	0
3	H	15	0	0	1	0
3	I	22	0	0	1	0
3	J	22	0	0	1	0
3	K	22	0	0	1	0
3	L	22	0	0	1	0
4	A	43	0	30	0	0
4	C	43	0	30	1	0
4	D	43	0	30	0	0
4	E	43	0	30	2	0
4	F	43	0	30	3	0
4	H	43	0	30	1	0
4	L	43	0	30	0	0
5	A	26	0	36	3	0
5	C	21	0	26	1	0
5	D	23	0	31	0	0
5	E	21	0	27	0	0
5	G	13	0	18	0	0
5	H	21	0	27	0	0
5	I	21	0	27	3	0
5	J	26	0	36	0	0
5	K	13	0	18	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	L	13	0	18	0	0
6	A	124	0	0	0	0
6	B	135	0	0	1	0
6	C	144	0	0	3	0
6	D	109	0	0	1	0
6	E	156	0	0	1	0
6	F	133	0	0	1	0
6	G	115	0	0	1	0
6	H	122	0	0	1	0
6	I	104	0	0	2	0
6	J	127	0	0	0	0
6	K	133	0	0	2	0
6	L	118	0	0	1	0
All	All	17552	0	15438	55	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (55) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:84:GLN:NE2	6:D:301:HOH:O	2.24	0.68
1:F:69:PRO:O	3:F:201:KTG:N03	2.34	0.61
1:B:69:PRO:O	3:B:202:KTG:N03	2.34	0.61
1:I:69:PRO:O	3:I:201:KTG:N03	2.34	0.61
1:H:69:PRO:O	3:H:201:KTG:N03	2.34	0.61
1:G:69:PRO:O	3:G:201:KTG:N03	2.34	0.60
1:E:69:PRO:O	3:E:201:KTG:N03	2.34	0.60
1:K:69:PRO:O	3:K:201:KTG:N03	2.34	0.60
1:A:69:PRO:O	3:A:202:KTG:N03	2.35	0.60
1:D:69:PRO:O	3:D:202:KTG:N03	2.35	0.60
1:C:69:PRO:O	3:C:201:KTG:N03	2.34	0.59
1:L:69:PRO:O	3:L:201:KTG:N03	2.35	0.59
1:J:69:PRO:O	3:J:201:KTG:N03	2.35	0.58
1:J:82:ASN:OD1	1:J:84:GLN:HG2	2.05	0.57
1:E:147[A]:GLU:H	1:E:147[A]:GLU:CD	2.08	0.56
1:A:20:ILE:HD11	1:A:75:GLY:HA3	1.93	0.51
5:I:202:PG4:H71	6:I:313:HOH:O	2.11	0.50
1:L:153:HIS:NE2	6:L:303:HOH:O	2.33	0.50
1:E:52:MET:HB3	4:E:202:HEM:CHB	2.43	0.49
1:K:84:GLN:HB3	6:K:373:HOH:O	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:76:LYS:CG	6:C:443:HOH:O	2.60	0.48
1:G:76:LYS:CG	6:G:413:HOH:O	2.61	0.47
1:E:39:ARG:HD3	1:E:153:HIS:CD2	2.50	0.47
4:E:202:HEM:HMC1	4:E:202:HEM:HBC2	1.96	0.47
5:I:202:PG4:C7	6:I:313:HOH:O	2.62	0.47
1:B:84:GLN:HG3	6:B:381:HOH:O	2.15	0.47
1:H:84:GLN:HG3	6:H:386:HOH:O	2.14	0.46
1:F:52:MET:HB3	4:F:202:HEM:CHD	2.46	0.45
1:E:99:LYS:CD	6:E:388:HOH:O	2.64	0.45
1:F:44:GLU:OE1	1:F:90:ASP:OD2	2.36	0.44
1:G:1:MET:O	1:G:65:LEU:HA	2.18	0.44
1:A:129:GLU:HG3	5:A:205:PG4:H52	1.99	0.44
1:E:44:GLU:OE1	1:E:90:ASP:OD2	2.36	0.44
4:H:202:HEM:HBC2	4:H:202:HEM:HMC2	2.01	0.43
4:F:202:HEM:CHB	1:K:52:MET:HB3	2.48	0.43
1:K:1:MET:O	1:K:65:LEU:HA	2.19	0.43
1:A:61:ARG:HD2	5:A:204:PG4:H81	2.01	0.43
1:A:1:MET:O	1:A:65:LEU:HA	2.19	0.42
1:F:50:ASP:CG	6:F:371:HOH:O	2.58	0.42
1:K:110:GLN:CG	6:K:429:HOH:O	2.68	0.42
1:C:84:GLN:HG3	6:C:397:HOH:O	2.20	0.41
4:F:202:HEM:HBC2	4:F:202:HEM:HMC1	2.02	0.41
1:I:38:LYS:NZ	5:I:203:PG4:O3	2.48	0.41
1:F:1:MET:O	1:F:65:LEU:HA	2.20	0.41
4:C:202:HEM:HMC2	4:C:202:HEM:HBC2	2.01	0.41
1:K:133:TYR:O	1:K:137:GLN:HG2	2.21	0.41
1:G:44:GLU:OE1	1:G:90:ASP:OD2	2.39	0.41
5:C:204:PG4:H51	6:C:338:HOH:O	2.20	0.41
1:A:20:ILE:HG23	1:A:77:LEU:HD12	2.03	0.41
1:B:20:ILE:HD11	1:B:75:GLY:HA3	2.02	0.41
1:A:129:GLU:HG3	5:A:205:PG4:H42	2.04	0.40
1:G:20:ILE:HD11	1:G:75:GLY:HA3	2.03	0.40
1:H:1:MET:O	1:H:65:LEU:HA	2.21	0.40
1:L:1:MET:O	1:L:65:LEU:HA	2.21	0.40
1:K:44:GLU:OE1	1:K:90:ASP:OD2	2.39	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	156/158 (99%)	154 (99%)	2 (1%)	0	100	100
1	B	156/158 (99%)	156 (100%)	0	0	100	100
1	C	156/158 (99%)	156 (100%)	0	0	100	100
1	D	156/158 (99%)	154 (99%)	2 (1%)	0	100	100
1	E	157/158 (99%)	157 (100%)	0	0	100	100
1	F	156/158 (99%)	156 (100%)	0	0	100	100
1	G	156/158 (99%)	156 (100%)	0	0	100	100
1	H	157/158 (99%)	157 (100%)	0	0	100	100
1	I	156/158 (99%)	156 (100%)	0	0	100	100
1	J	156/158 (99%)	155 (99%)	1 (1%)	0	100	100
1	K	156/158 (99%)	155 (99%)	1 (1%)	0	100	100
1	L	157/158 (99%)	157 (100%)	0	0	100	100
All	All	1875/1896 (99%)	1869 (100%)	6 (0%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	139/144 (96%)	137 (99%)	2 (1%)	67	55
1	B	138/144 (96%)	138 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	136/144 (94%)	136 (100%)	0	100	100
1	D	139/144 (96%)	138 (99%)	1 (1%)	84	79
1	E	139/144 (96%)	139 (100%)	0	100	100
1	F	135/144 (94%)	134 (99%)	1 (1%)	84	79
1	G	137/144 (95%)	137 (100%)	0	100	100
1	H	137/144 (95%)	137 (100%)	0	100	100
1	I	136/144 (94%)	135 (99%)	1 (1%)	84	79
1	J	138/144 (96%)	137 (99%)	1 (1%)	84	79
1	K	139/144 (96%)	139 (100%)	0	100	100
1	L	139/144 (96%)	138 (99%)	1 (1%)	84	79
All	All	1652/1728 (96%)	1645 (100%)	7 (0%)	91	89

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	50	ASP
1	A	77	LEU
1	D	50	ASP
1	F	121	LYS
1	I	121	LYS
1	J	121	LYS
1	L	121	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 39 ligands modelled in this entry, 3 are monoatomic - leaving 36 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	HEM	D	203	1	41,50,50	1.46	5 (12%)	45,82,82	1.55	9 (20%)
5	PG4	D	205	-	9,9,12	0.63	0	8,8,11	0.29	0
5	PG4	E	203	-	12,12,12	0.59	0	11,11,11	0.53	0
3	KTG	J	201	-	24,24,24	1.84	5 (20%)	33,33,33	1.25	3 (9%)
3	KTG	K	201	-	24,24,24	1.83	4 (16%)	33,33,33	1.08	2 (6%)
3	KTG	H	201	-	16,16,24	1.94	5 (31%)	22,22,33	1.66	3 (13%)
5	PG4	A	205	-	12,12,12	0.48	0	11,11,11	0.39	0
5	PG4	J	202	-	12,12,12	0.53	0	11,11,11	0.43	0
5	PG4	I	203	-	7,7,12	0.56	0	6,6,11	0.21	0
5	PG4	D	204	-	12,12,12	0.52	0	11,11,11	0.35	0
5	PG4	J	203	-	12,12,12	0.39	0	11,11,11	0.58	0
4	HEM	L	202	1	41,50,50	1.40	3 (7%)	45,82,82	1.58	9 (20%)
4	HEM	F	202	1	41,50,50	1.45	4 (9%)	45,82,82	1.69	10 (22%)
5	PG4	E	204	-	7,7,12	0.63	0	6,6,11	0.17	0
3	KTG	E	201	-	24,24,24	1.72	4 (16%)	33,33,33	1.12	3 (9%)
5	PG4	I	202	-	12,12,12	0.36	0	11,11,11	0.81	0
5	PG4	K	202	-	12,12,12	0.59	0	11,11,11	0.35	0
3	KTG	B	202	-	24,24,24	1.70	6 (25%)	33,33,33	1.07	2 (6%)
5	PG4	G	202	-	12,12,12	0.50	0	11,11,11	0.57	0
3	KTG	F	201	-	24,24,24	1.66	5 (20%)	33,33,33	1.02	3 (9%)
3	KTG	D	202	-	14,14,24	2.35	5 (35%)	19,20,33	1.26	2 (10%)
4	HEM	H	202	1	41,50,50	1.51	4 (9%)	45,82,82	1.83	11 (24%)
5	PG4	H	204	-	7,7,12	0.58	0	6,6,11	0.31	0
4	HEM	C	202	1	41,50,50	1.44	6 (14%)	45,82,82	1.89	16 (35%)
5	PG4	L	203	-	12,12,12	0.47	0	11,11,11	0.42	0
4	HEM	E	202	1	41,50,50	1.44	7 (17%)	45,82,82	1.75	14 (31%)
5	PG4	C	204	-	9,9,12	0.57	0	8,8,11	0.47	0
4	HEM	A	203	1	41,50,50	1.50	4 (9%)	45,82,82	1.72	12 (26%)
3	KTG	A	202	-	14,14,24	2.53	5 (35%)	19,20,33	1.35	2 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	PG4	C	203	-	10,10,12	0.53	0	9,9,11	0.46	0
5	PG4	A	204	-	12,12,12	0.62	0	11,11,11	0.49	0
3	KTG	I	201	-	24,24,24	1.78	4 (16%)	33,33,33	0.95	1 (3%)
3	KTG	L	201	-	24,24,24	1.84	4 (16%)	33,33,33	1.21	2 (6%)
3	KTG	G	201	-	24,24,24	1.73	5 (20%)	33,33,33	1.09	2 (6%)
5	PG4	H	203	-	12,12,12	0.47	0	11,11,11	0.49	0
3	KTG	C	201	-	24,24,24	1.71	4 (16%)	33,33,33	1.19	3 (9%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	HEM	D	203	1	-	4/12/54/54	-
5	PG4	D	205	-	-	0/7/7/10	-
5	PG4	E	203	-	-	1/10/10/10	-
3	KTG	J	201	-	-	0/7/19/19	0/3/3/3
3	KTG	K	201	-	-	0/7/19/19	0/3/3/3
3	KTG	H	201	-	-	1/4/16/19	0/2/2/3
5	PG4	A	205	-	-	1/10/10/10	-
5	PG4	J	202	-	-	1/10/10/10	-
5	PG4	I	203	-	-	1/5/5/10	-
5	PG4	D	204	-	-	3/10/10/10	-
5	PG4	J	203	-	-	0/10/10/10	-
4	HEM	L	202	1	-	4/12/54/54	-
4	HEM	F	202	1	-	4/12/54/54	-
5	PG4	E	204	-	-	0/5/5/10	-
3	KTG	E	201	-	-	0/7/19/19	0/3/3/3
5	PG4	I	202	-	-	3/10/10/10	-
5	PG4	K	202	-	-	2/10/10/10	-
3	KTG	B	202	-	-	2/7/19/19	0/3/3/3
5	PG4	G	202	-	-	5/10/10/10	-
3	KTG	F	201	-	-	0/7/19/19	0/3/3/3
3	KTG	D	202	-	-	0/2/14/19	0/2/2/3
4	HEM	H	202	1	-	4/12/54/54	-
5	PG4	H	204	-	-	0/5/5/10	-
4	HEM	C	202	1	-	4/12/54/54	-
5	PG4	L	203	-	-	3/10/10/10	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	HEM	E	202	1	-	4/12/54/54	-
5	PG4	C	204	-	-	3/7/7/10	-
4	HEM	A	203	1	-	4/12/54/54	-
3	KTG	A	202	-	-	0/2/14/19	0/2/2/3
5	PG4	C	203	-	-	0/8/8/10	-
5	PG4	A	204	-	-	5/10/10/10	-
3	KTG	I	201	-	-	0/7/19/19	0/3/3/3
3	KTG	L	201	-	-	0/7/19/19	0/3/3/3
3	KTG	G	201	-	-	0/7/19/19	0/3/3/3
5	PG4	H	203	-	-	4/10/10/10	-
3	KTG	C	201	-	-	1/7/19/19	0/3/3/3

All (89) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	203	HEM	C3C-C2C	-4.96	1.33	1.40
3	I	201	KTG	C21-C02	4.87	1.56	1.48
3	D	202	KTG	C06-N07	4.80	1.46	1.37
3	A	202	KTG	C06-N07	4.76	1.46	1.37
3	C	201	KTG	C21-C02	4.75	1.55	1.48
3	A	202	KTG	C21-C02	4.62	1.55	1.48
3	K	201	KTG	C21-C02	4.57	1.55	1.48
3	J	201	KTG	C04-N03	4.52	1.45	1.38
4	H	202	HEM	C3C-C2C	-4.52	1.34	1.40
3	A	202	KTG	C04-N03	4.47	1.45	1.38
3	G	201	KTG	C04-N03	4.38	1.45	1.38
3	L	201	KTG	C21-C02	4.35	1.55	1.48
3	B	202	KTG	C21-C02	4.23	1.55	1.48
3	K	201	KTG	C04-N03	4.16	1.44	1.38
3	L	201	KTG	C04-N03	4.16	1.44	1.38
3	L	201	KTG	C02-N03	4.15	1.44	1.38
3	J	201	KTG	C02-N03	4.14	1.44	1.38
3	E	201	KTG	C21-C02	4.06	1.54	1.48
4	E	202	HEM	C3C-C2C	-3.96	1.34	1.40
3	H	201	KTG	C21-C02	3.95	1.54	1.48
3	D	202	KTG	C02-N03	3.91	1.44	1.38
3	G	201	KTG	C21-C02	3.86	1.54	1.48
3	K	201	KTG	C02-N03	3.85	1.44	1.38
4	L	202	HEM	C3C-CAC	3.85	1.55	1.47
3	D	202	KTG	C21-C02	3.78	1.54	1.48
4	H	202	HEM	C3C-CAC	3.76	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	202	HEM	C3C-C2C	-3.76	1.35	1.40
4	D	203	HEM	C3C-C2C	-3.76	1.35	1.40
3	E	201	KTG	C04-N03	3.71	1.44	1.38
4	F	202	HEM	C3C-C2C	-3.71	1.35	1.40
3	D	202	KTG	C04-N03	3.66	1.44	1.38
4	D	203	HEM	C3C-CAC	3.65	1.55	1.47
3	I	201	KTG	C02-N03	3.64	1.44	1.38
3	F	201	KTG	C04-N03	3.58	1.43	1.38
3	I	201	KTG	C04-N03	3.54	1.43	1.38
4	F	202	HEM	C3C-CAC	3.51	1.55	1.47
3	F	201	KTG	C21-C02	3.49	1.53	1.48
3	E	201	KTG	C02-N03	3.47	1.43	1.38
3	H	201	KTG	C04-N03	3.46	1.43	1.38
3	J	201	KTG	C06-N07	3.43	1.46	1.37
3	J	201	KTG	C21-C02	3.43	1.53	1.48
4	C	202	HEM	C3C-CAC	3.42	1.54	1.47
3	B	202	KTG	C06-N07	3.41	1.46	1.37
4	L	202	HEM	C3C-C2C	-3.37	1.35	1.40
3	L	201	KTG	C06-N07	3.29	1.46	1.37
3	B	202	KTG	C04-N03	3.27	1.43	1.38
3	C	201	KTG	C04-N03	3.26	1.43	1.38
3	F	201	KTG	C06-N07	3.24	1.46	1.37
3	I	201	KTG	C06-N07	3.23	1.46	1.37
3	H	201	KTG	C06-N07	3.20	1.46	1.37
3	K	201	KTG	C06-N07	3.19	1.46	1.37
3	F	201	KTG	C02-N03	3.17	1.43	1.38
3	E	201	KTG	C06-N07	3.16	1.46	1.37
4	E	202	HEM	C3C-CAC	3.14	1.54	1.47
3	C	201	KTG	C06-N07	3.06	1.45	1.37
3	B	202	KTG	C02-N03	3.03	1.43	1.38
3	C	201	KTG	C02-N03	3.01	1.43	1.38
3	H	201	KTG	C02-N03	3.00	1.43	1.38
4	A	203	HEM	C3C-CAC	2.99	1.53	1.47
3	A	202	KTG	C02-N03	2.96	1.43	1.38
3	G	201	KTG	C06-N07	2.92	1.45	1.37
3	G	201	KTG	C02-N03	2.79	1.42	1.38
4	L	202	HEM	CAB-C3B	2.73	1.54	1.47
3	G	201	KTG	O01-C02	-2.72	1.17	1.23
3	A	202	KTG	O01-C02	-2.70	1.17	1.23
4	E	202	HEM	CMB-C2B	2.64	1.56	1.50
4	D	203	HEM	CAB-C3B	2.59	1.54	1.47
4	C	202	HEM	CAB-C3B	2.51	1.54	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	203	HEM	FE-ND	2.50	2.09	1.96
4	F	202	HEM	CAB-C3B	2.48	1.54	1.47
4	H	202	HEM	CAB-C3B	2.48	1.54	1.47
4	A	203	HEM	CAB-C3B	2.44	1.54	1.47
4	E	202	HEM	C4D-ND	-2.42	1.36	1.40
4	D	203	HEM	CAA-C2A	2.34	1.55	1.52
3	J	201	KTG	O01-C02	-2.34	1.18	1.23
4	E	202	HEM	CMD-C2D	2.34	1.55	1.50
3	F	201	KTG	O01-C02	-2.29	1.18	1.23
4	H	202	HEM	CAA-C2A	2.28	1.55	1.52
4	C	202	HEM	CMD-C2D	2.27	1.55	1.50
3	H	201	KTG	O01-C02	-2.26	1.18	1.23
3	B	202	KTG	O01-C02	-2.25	1.18	1.23
3	B	202	KTG	O15-C14	2.17	1.42	1.37
4	F	202	HEM	CMB-C2B	2.16	1.55	1.50
4	E	202	HEM	CAB-C3B	2.14	1.53	1.47
3	D	202	KTG	O01-C02	-2.13	1.19	1.23
4	C	202	HEM	CMC-C2C	2.13	1.56	1.51
4	E	202	HEM	C4A-NA	2.12	1.40	1.36
4	A	203	HEM	CAA-C2A	2.10	1.55	1.52
4	C	202	HEM	CMB-C2B	2.01	1.55	1.50

All (109) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	201	KTG	C05-C06-N07	-4.96	115.44	121.32
4	A	203	HEM	CMC-C2C-C3C	4.44	132.98	124.68
4	C	202	HEM	C4D-ND-C1D	4.33	109.54	105.07
4	H	202	HEM	C4B-CHC-C1C	4.23	128.13	122.56
3	L	201	KTG	C04-N03-C02	-4.20	108.94	112.52
4	F	202	HEM	CMC-C2C-C3C	4.11	132.37	124.68
3	J	201	KTG	C05-C06-N07	-4.11	116.45	121.32
3	C	201	KTG	C05-C06-N07	-4.08	116.48	121.32
4	E	202	HEM	C4D-ND-C1D	4.08	109.28	105.07
4	E	202	HEM	CMC-C2C-C3C	4.05	132.25	124.68
4	C	202	HEM	CMC-C2C-C3C	3.99	132.15	124.68
4	H	202	HEM	C1B-NB-C4B	3.93	109.13	105.07
3	E	201	KTG	C05-C06-N07	-3.81	116.81	121.32
4	H	202	HEM	C4D-ND-C1D	3.80	109.00	105.07
3	A	202	KTG	C04-N03-C02	-3.76	109.32	112.52
3	G	201	KTG	C21-C05-C06	-3.70	119.37	121.91
4	D	203	HEM	C4D-ND-C1D	3.69	108.88	105.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	K	201	KTG	C05-C06-N07	-3.68	116.96	121.32
4	L	202	HEM	CMC-C2C-C3C	3.63	131.47	124.68
3	D	202	KTG	C04-N03-C02	-3.58	109.47	112.52
3	J	201	KTG	C04-N03-C02	-3.54	109.50	112.52
3	I	201	KTG	C05-C06-N07	-3.50	117.18	121.32
3	B	202	KTG	C05-C06-N07	-3.49	117.19	121.32
4	H	202	HEM	CMA-C3A-C4A	-3.47	123.12	128.46
4	E	202	HEM	C1B-NB-C4B	3.46	108.64	105.07
4	L	202	HEM	C4D-ND-C1D	3.41	108.59	105.07
4	A	203	HEM	C4D-ND-C1D	3.38	108.57	105.07
4	D	203	HEM	CMC-C2C-C3C	3.35	130.94	124.68
3	F	201	KTG	C05-C06-N07	-3.33	117.38	121.32
4	A	203	HEM	CBA-CAA-C2A	-3.32	106.95	112.62
3	H	201	KTG	C21-C05-C06	-3.32	119.63	121.91
4	F	202	HEM	C4D-ND-C1D	3.30	108.48	105.07
3	L	201	KTG	C05-C06-N07	-3.28	117.43	121.32
4	H	202	HEM	CMC-C2C-C3C	3.24	130.73	124.68
4	C	202	HEM	C4B-CHC-C1C	3.20	126.79	122.56
4	H	202	HEM	CHD-C1D-ND	3.11	127.81	124.43
4	D	203	HEM	C4C-CHD-C1D	3.07	126.61	122.56
4	E	202	HEM	CBA-CAA-C2A	-3.05	107.42	112.62
4	F	202	HEM	C4C-CHD-C1D	3.01	126.53	122.56
3	G	201	KTG	C05-C06-N07	-2.98	117.79	121.32
4	F	202	HEM	CBA-CAA-C2A	-2.93	107.63	112.62
4	A	203	HEM	C1B-NB-C4B	2.89	108.06	105.07
4	L	202	HEM	C4C-CHD-C1D	2.88	126.36	122.56
4	E	202	HEM	C4C-CHD-C1D	2.87	126.35	122.56
4	C	202	HEM	C1B-NB-C4B	2.83	108.00	105.07
4	C	202	HEM	C2D-C1D-ND	-2.77	106.56	109.88
4	C	202	HEM	CMA-C3A-C4A	-2.74	124.25	128.46
4	F	202	HEM	C2C-C3C-C4C	2.74	108.81	106.90
4	C	202	HEM	CAD-CBD-CGD	-2.72	107.75	113.60
4	F	202	HEM	C4B-CHC-C1C	2.66	126.06	122.56
4	A	203	HEM	C4B-CHC-C1C	2.62	126.01	122.56
3	E	201	KTG	C21-C05-C06	-2.61	120.12	121.91
4	L	202	HEM	C3B-C2B-C1B	2.58	108.40	106.49
4	L	202	HEM	C4B-CHC-C1C	2.58	125.97	122.56
4	H	202	HEM	CBA-CAA-C2A	-2.56	108.25	112.62
3	H	201	KTG	O22-C04-C05	2.55	132.34	128.55
4	D	203	HEM	C1B-NB-C4B	2.54	107.70	105.07
4	L	202	HEM	C1B-NB-C4B	2.54	107.69	105.07
3	F	201	KTG	C21-C05-C06	-2.53	120.17	121.91

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	203	HEM	CMB-C2B-C1B	-2.53	121.19	125.04
4	C	202	HEM	CBA-CAA-C2A	-2.53	108.31	112.62
4	C	202	HEM	C3D-C4D-ND	-2.51	107.38	110.17
4	D	203	HEM	CAD-CBD-CGD	-2.51	108.21	113.60
4	C	202	HEM	CHA-C4D-ND	2.48	127.45	124.38
3	D	202	KTG	C21-C05-C06	-2.47	120.21	121.91
3	K	201	KTG	C04-N03-C02	-2.47	110.42	112.52
4	D	203	HEM	C3D-C4D-ND	-2.45	107.44	110.17
4	F	202	HEM	C1B-NB-C4B	2.44	107.59	105.07
4	A	203	HEM	C3D-C4D-ND	-2.43	107.46	110.17
4	H	202	HEM	C2D-C1D-ND	-2.43	106.97	109.88
4	F	202	HEM	C2D-C1D-ND	-2.42	106.98	109.88
4	H	202	HEM	C4A-C3A-C2A	2.41	108.67	107.00
4	L	202	HEM	CMB-C2B-C1B	-2.40	121.38	125.04
4	L	202	HEM	C3D-C4D-ND	-2.36	107.54	110.17
3	C	201	KTG	C21-C05-C06	-2.34	120.30	121.91
4	E	202	HEM	C2D-C1D-ND	-2.32	107.11	109.88
3	J	201	KTG	C21-C05-C06	-2.31	120.32	121.91
4	E	202	HEM	CHC-C4B-NB	2.29	126.92	124.43
3	A	202	KTG	C21-C02-N03	2.29	107.99	105.89
4	E	202	HEM	O2D-CGD-CBD	2.28	121.36	114.03
4	E	202	HEM	CHD-C1D-ND	2.27	126.90	124.43
4	D	203	HEM	C4B-CHC-C1C	2.27	125.56	122.56
4	A	203	HEM	C2C-C3C-C4C	2.25	108.47	106.90
3	E	201	KTG	O22-C04-C05	2.24	131.88	128.55
4	E	202	HEM	C2C-C3C-C4C	2.24	108.46	106.90
4	E	202	HEM	C3D-C4D-ND	-2.24	107.68	110.17
4	E	202	HEM	C4B-C3B-C2B	2.23	108.88	107.11
4	C	202	HEM	C2C-C3C-C4C	2.22	108.45	106.90
4	C	202	HEM	CMB-C2B-C1B	-2.18	121.72	125.04
4	H	202	HEM	C3D-C4D-ND	-2.17	107.75	110.17
4	F	202	HEM	CMA-C3A-C4A	-2.16	125.14	128.46
3	B	202	KTG	C21-C05-C06	-2.16	120.42	121.91
4	A	203	HEM	CBB-CAB-C3B	-2.16	116.87	127.62
4	E	202	HEM	C4B-CHC-C1C	2.14	125.38	122.56
4	D	203	HEM	C2D-C1D-ND	-2.14	107.32	109.88
4	A	203	HEM	CHD-C1D-ND	2.13	126.75	124.43
4	A	203	HEM	CMA-C3A-C4A	-2.13	125.19	128.46
3	F	201	KTG	O22-C04-C05	2.12	131.71	128.55
4	C	202	HEM	CHC-C4B-NB	2.12	126.74	124.43
4	C	202	HEM	C4C-CHD-C1D	2.11	125.35	122.56
4	D	203	HEM	C3B-C2B-C1B	2.11	108.05	106.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	L	202	HEM	C2D-C1D-ND	-2.09	107.38	109.88
4	A	203	HEM	CHB-C1B-NB	2.09	126.96	124.38
4	H	202	HEM	CHC-C4B-NB	2.07	126.68	124.43
4	C	202	HEM	CAD-C3D-C4D	-2.06	121.06	124.66
4	F	202	HEM	C3D-C4D-ND	-2.04	107.89	110.17
3	C	201	KTG	O22-C04-C05	2.04	131.59	128.55
4	E	202	HEM	CAD-CBD-CGD	-2.04	109.21	113.60
4	C	202	HEM	CBD-CAD-C3D	-2.01	107.03	112.63

There are no chirality outliers.

All (64) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	204	PG4	O2-C3-C4-O3
5	H	203	PG4	O4-C7-C8-O5
3	B	202	KTG	N07-C08-C09-C10
5	C	204	PG4	O3-C5-C6-O4
5	D	204	PG4	O1-C1-C2-O2
5	G	202	PG4	O4-C7-C8-O5
5	D	204	PG4	O4-C7-C8-O5
5	L	203	PG4	O1-C1-C2-O2
5	G	202	PG4	O3-C5-C6-O4
5	I	202	PG4	O3-C5-C6-O4
5	H	203	PG4	O1-C1-C2-O2
5	E	203	PG4	O3-C5-C6-O4
5	G	202	PG4	C5-C6-O4-C7
5	H	203	PG4	O2-C3-C4-O3
5	K	202	PG4	O3-C5-C6-O4
3	C	201	KTG	N07-C08-C09-C10
5	A	204	PG4	O4-C7-C8-O5
5	I	202	PG4	O1-C1-C2-O2
5	L	203	PG4	O4-C7-C8-O5
5	C	204	PG4	C3-C4-O3-C5
5	A	204	PG4	C6-C5-O3-C4
5	J	202	PG4	C8-C7-O4-C6
5	G	202	PG4	C8-C7-O4-C6
5	H	203	PG4	O3-C5-C6-O4
5	A	204	PG4	C8-C7-O4-C6
5	K	202	PG4	O4-C7-C8-O5
4	D	203	HEM	C1A-C2A-CAA-CBA
4	D	203	HEM	C3A-C2A-CAA-CBA
5	A	204	PG4	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
5	A	205	PG4	O1-C1-C2-O2
5	L	203	PG4	C4-C3-O2-C2
4	A	203	HEM	CAD-CBD-CGD-O1D
4	A	203	HEM	CAD-CBD-CGD-O2D
4	F	202	HEM	CAA-CBA-CGA-O1A
4	L	202	HEM	CAA-CBA-CGA-O2A
4	C	202	HEM	CAA-CBA-CGA-O1A
4	E	202	HEM	CAD-CBD-CGD-O2D
4	F	202	HEM	CAA-CBA-CGA-O2A
4	E	202	HEM	CAD-CBD-CGD-O1D
4	F	202	HEM	CAD-CBD-CGD-O2D
4	F	202	HEM	CAD-CBD-CGD-O1D
4	L	202	HEM	CAA-CBA-CGA-O1A
4	L	202	HEM	CAD-CBD-CGD-O1D
4	C	202	HEM	CAA-CBA-CGA-O2A
4	C	202	HEM	CAD-CBD-CGD-O2D
3	H	201	KTG	N07-C08-C09-C10
4	L	202	HEM	CAD-CBD-CGD-O2D
4	C	202	HEM	CAD-CBD-CGD-O1D
5	I	203	PG4	O3-C5-C6-O4
4	A	203	HEM	CAA-CBA-CGA-O2A
4	D	203	HEM	CAD-CBD-CGD-O2D
4	E	202	HEM	CAA-CBA-CGA-O2A
4	H	202	HEM	CAD-CBD-CGD-O2D
4	A	203	HEM	CAA-CBA-CGA-O1A
5	A	204	PG4	C5-C6-O4-C7
4	H	202	HEM	CAD-CBD-CGD-O1D
4	D	203	HEM	CAD-CBD-CGD-O1D
5	I	202	PG4	O2-C3-C4-O3
4	H	202	HEM	CAA-CBA-CGA-O2A
4	E	202	HEM	CAA-CBA-CGA-O1A
5	D	204	PG4	C1-C2-O2-C3
4	H	202	HEM	CAA-CBA-CGA-O1A
3	B	202	KTG	C05-C06-N07-C08
5	G	202	PG4	O1-C1-C2-O2

There are no ring outliers.

21 monomers are involved in 26 short contacts:

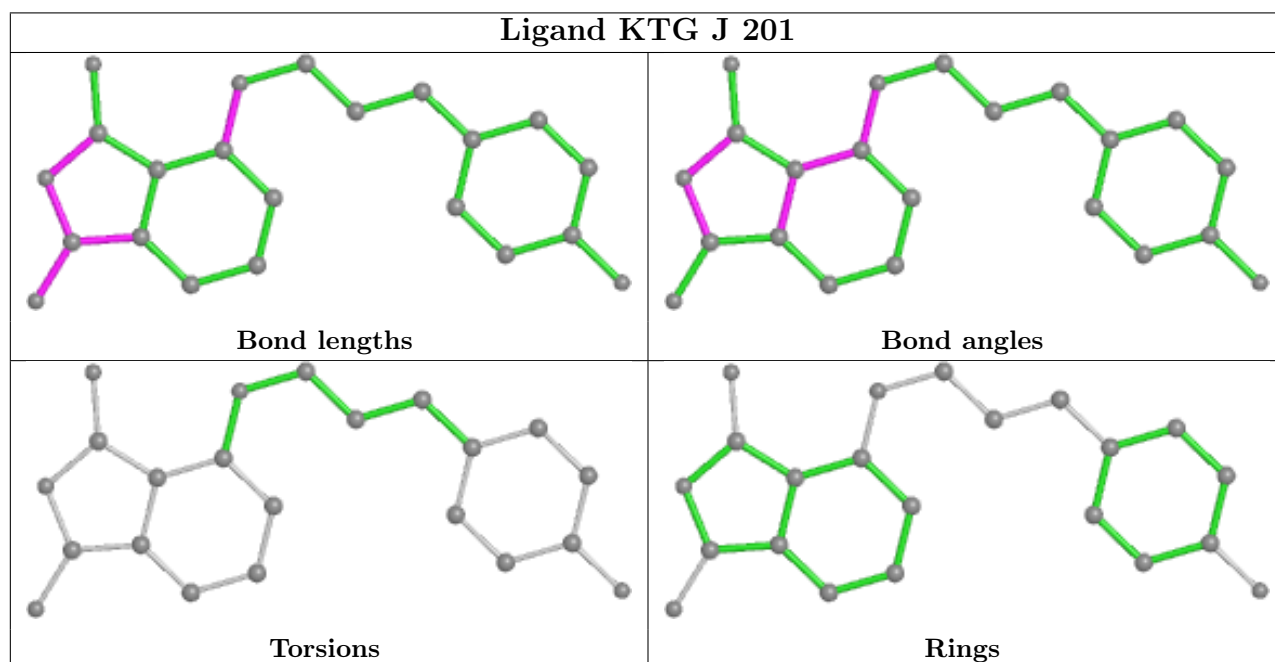
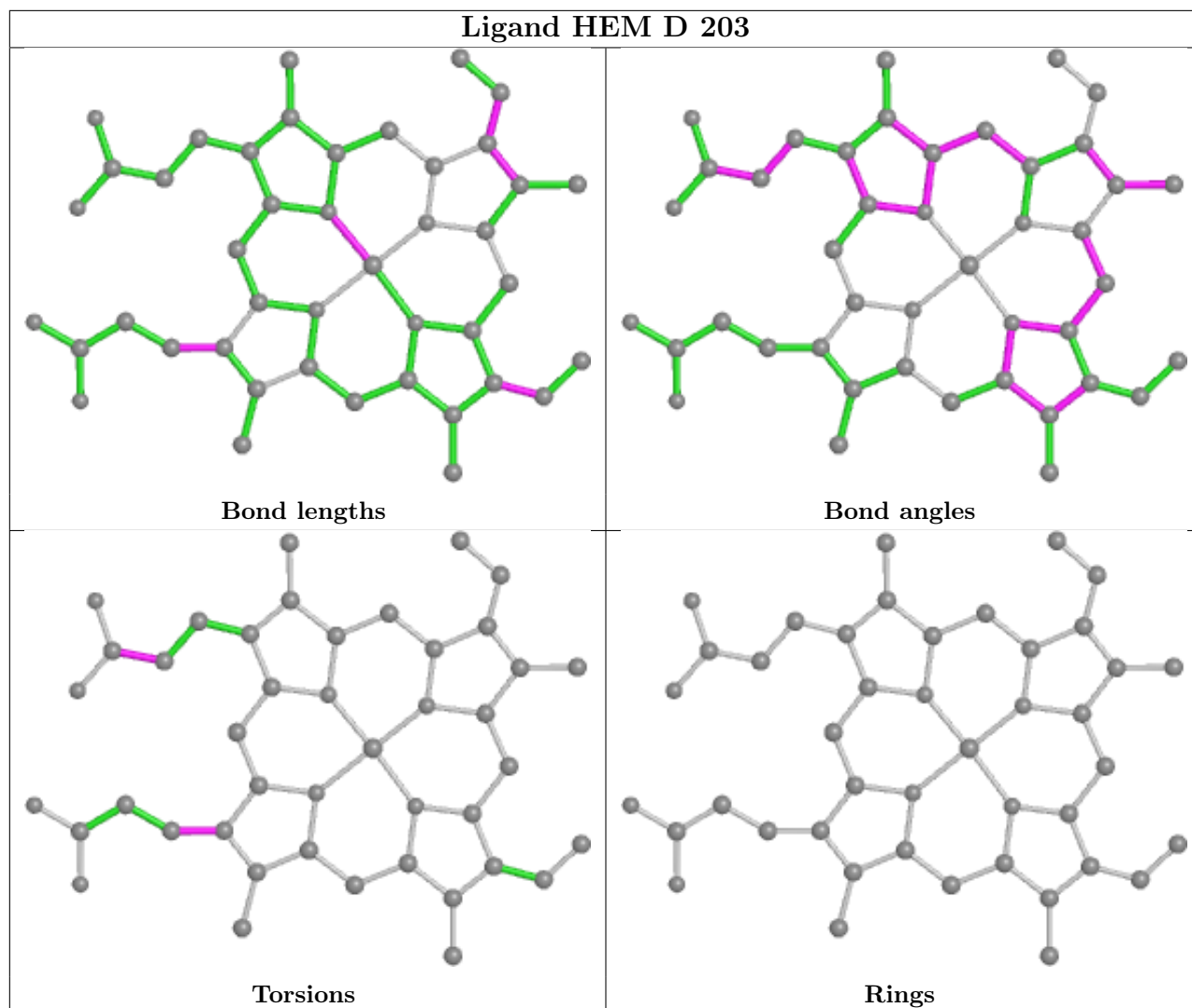
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	J	201	KTG	1	0
3	K	201	KTG	1	0

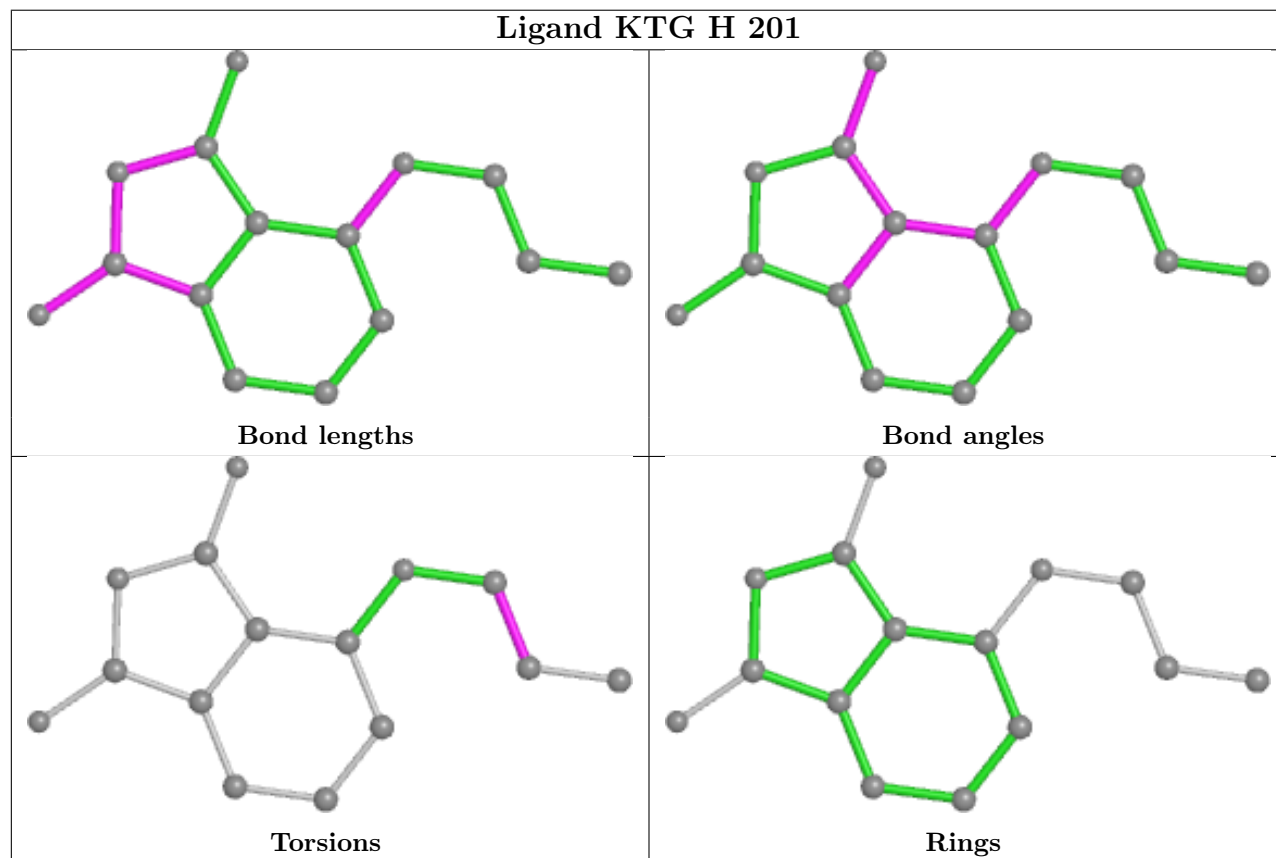
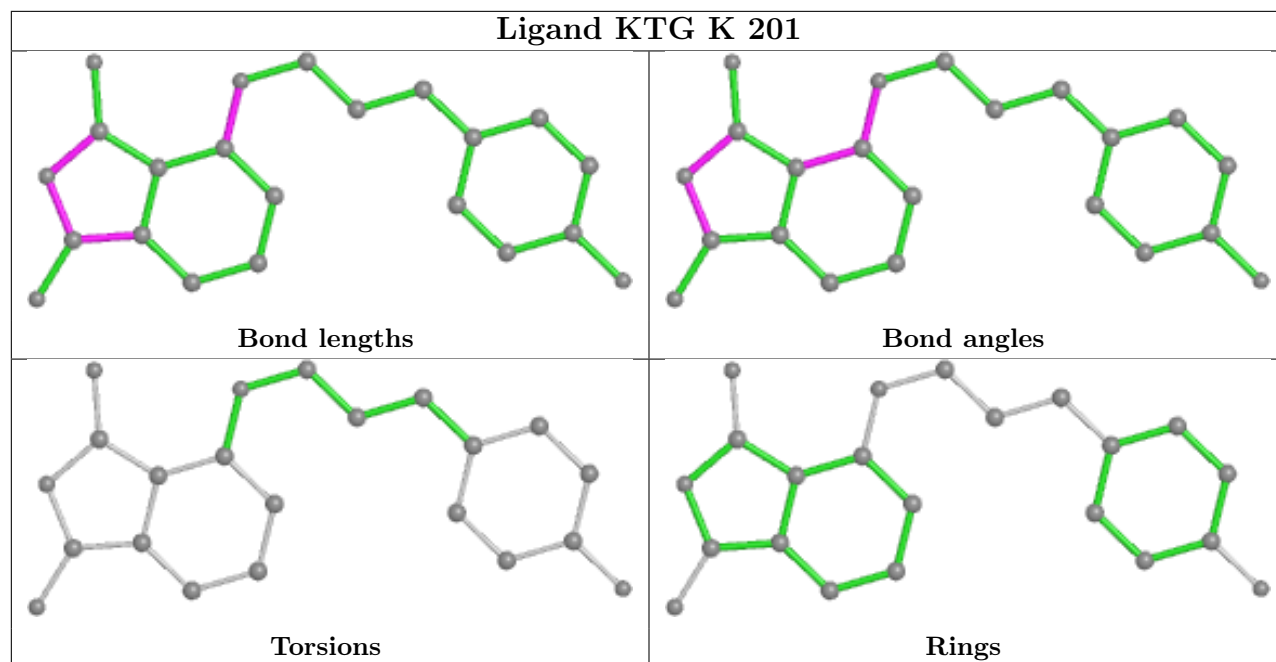
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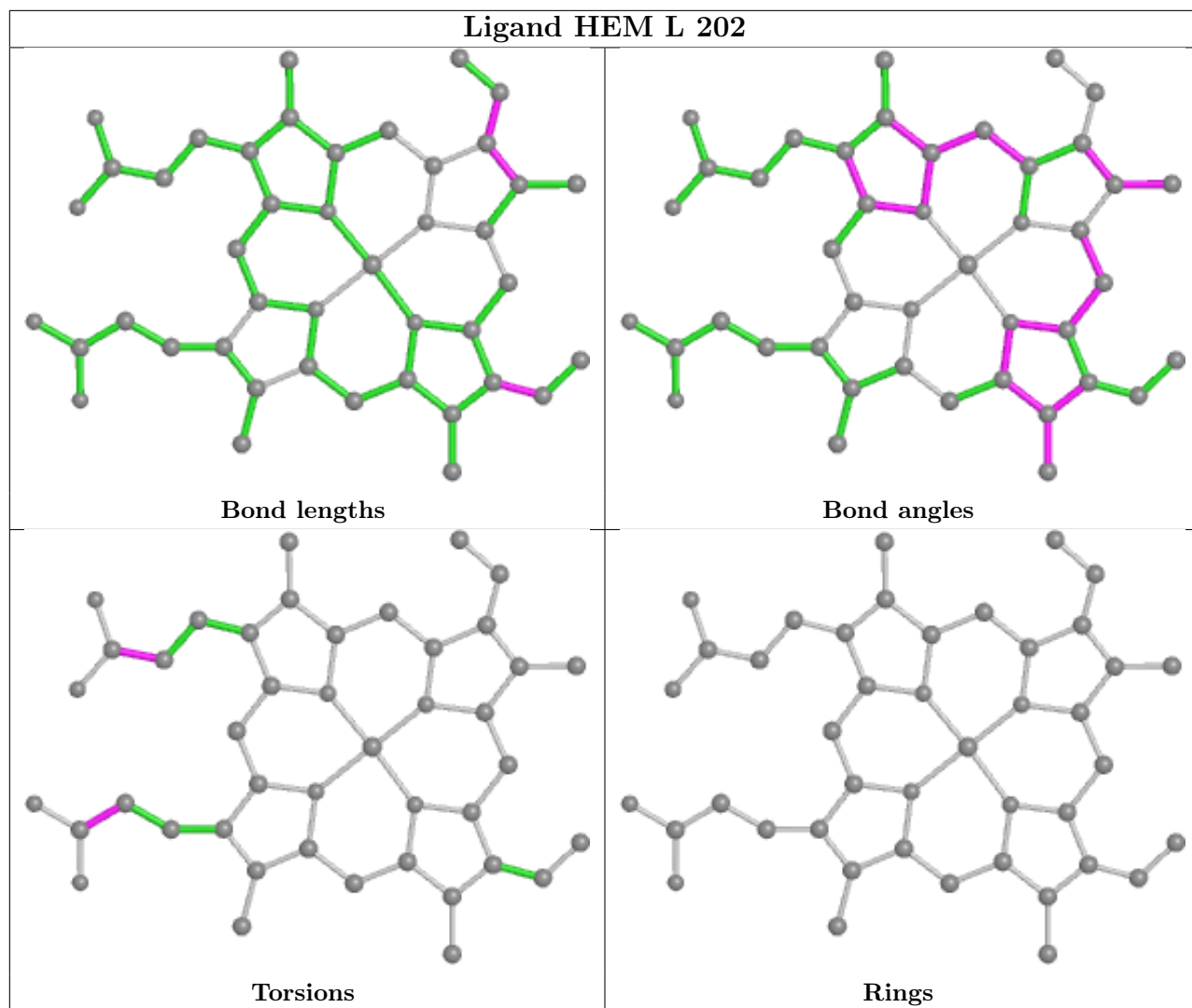
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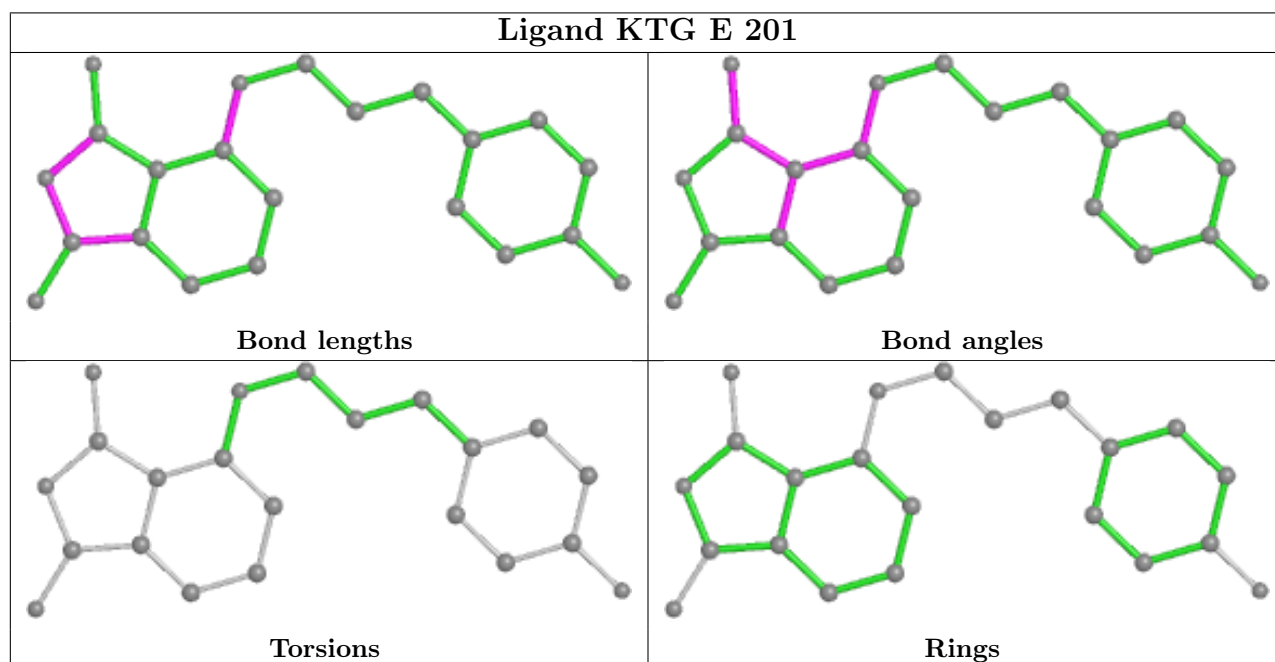
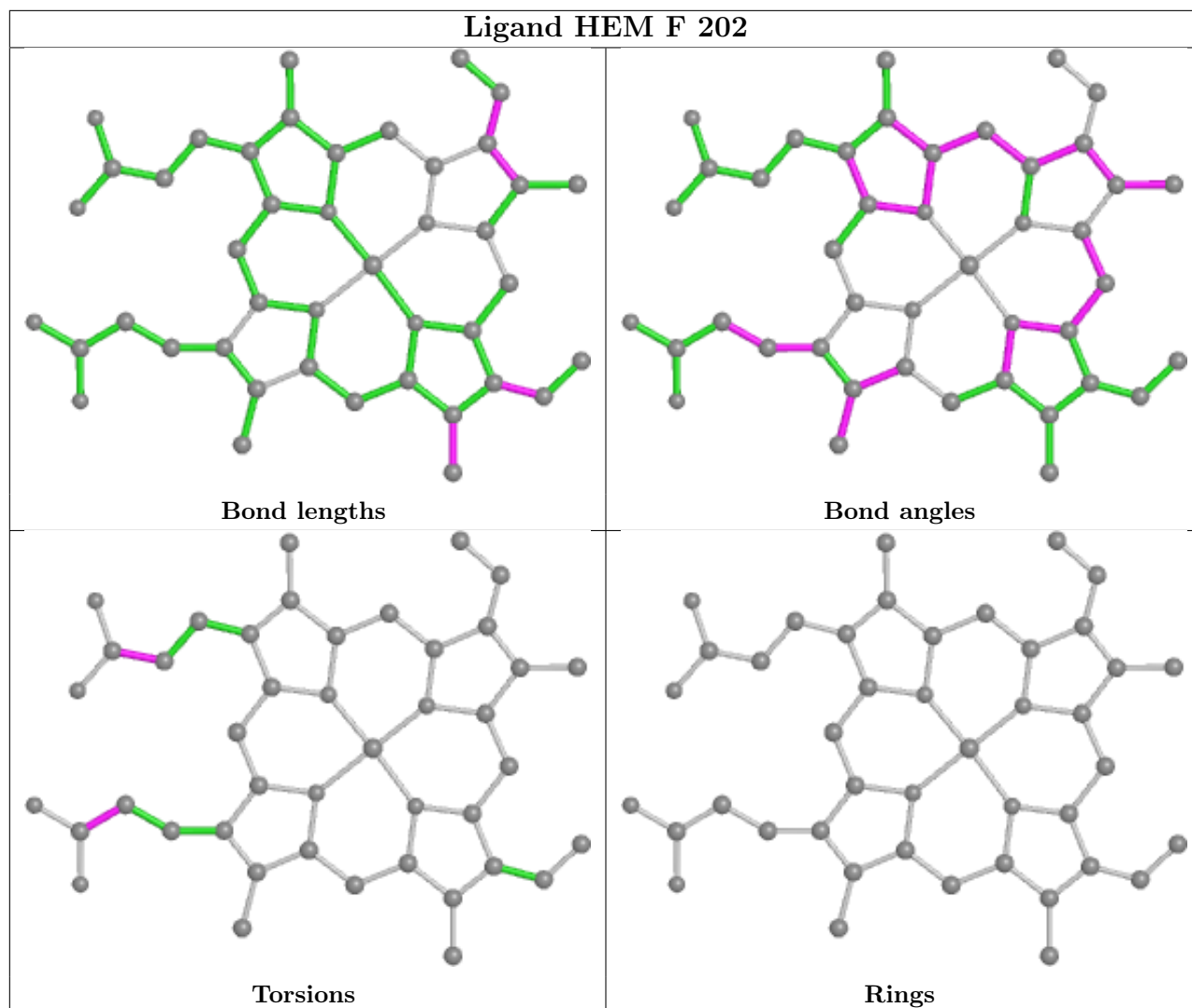
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	H	201	KTG	1	0
5	A	205	PG4	2	0
5	I	203	PG4	1	0
4	F	202	HEM	3	0
3	E	201	KTG	1	0
5	I	202	PG4	2	0
3	B	202	KTG	1	0
3	F	201	KTG	1	0
3	D	202	KTG	1	0
4	H	202	HEM	1	0
4	C	202	HEM	1	0
4	E	202	HEM	2	0
5	C	204	PG4	1	0
3	A	202	KTG	1	0
5	A	204	PG4	1	0
3	I	201	KTG	1	0
3	L	201	KTG	1	0
3	G	201	KTG	1	0
3	C	201	KTG	1	0

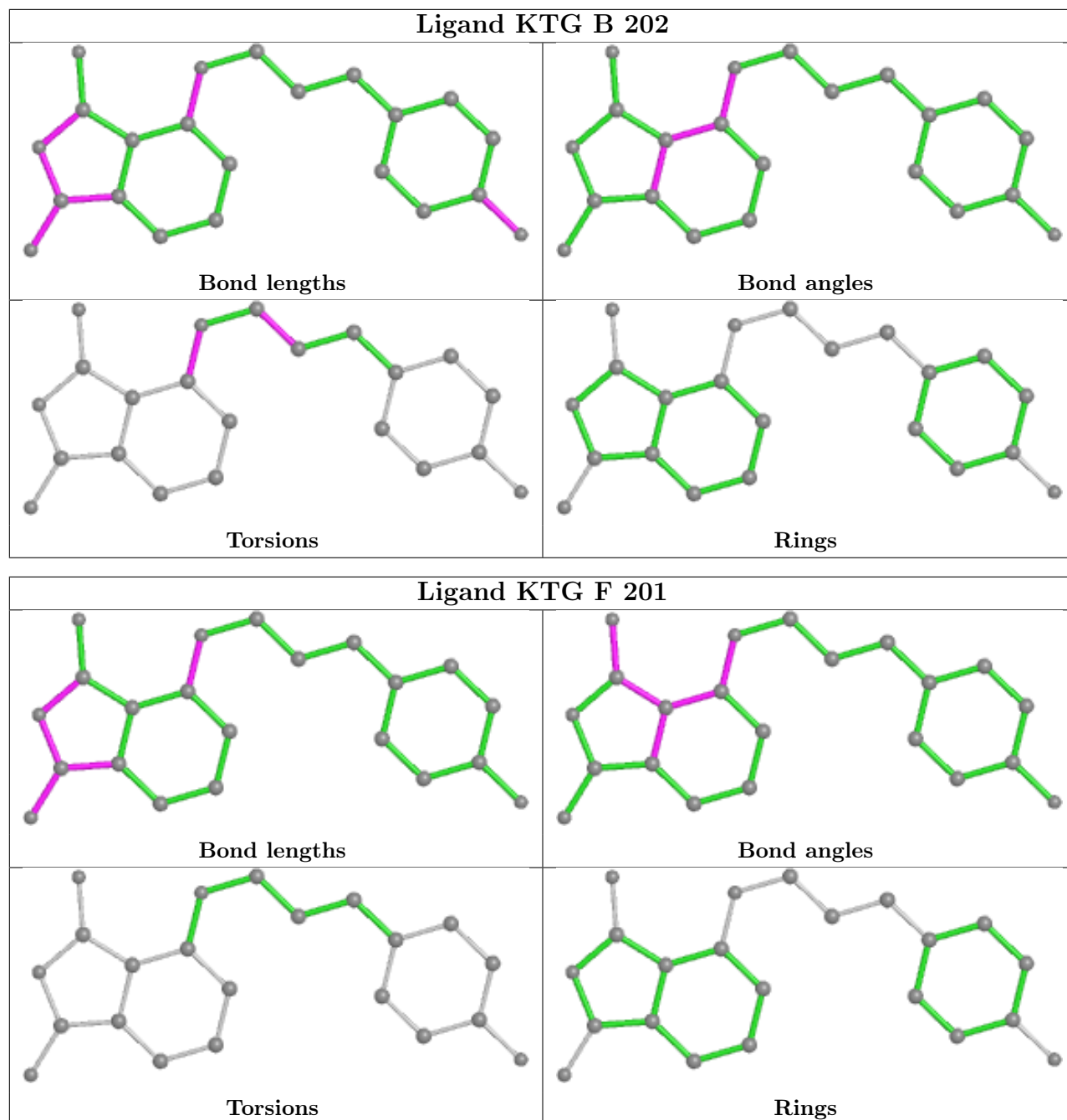
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



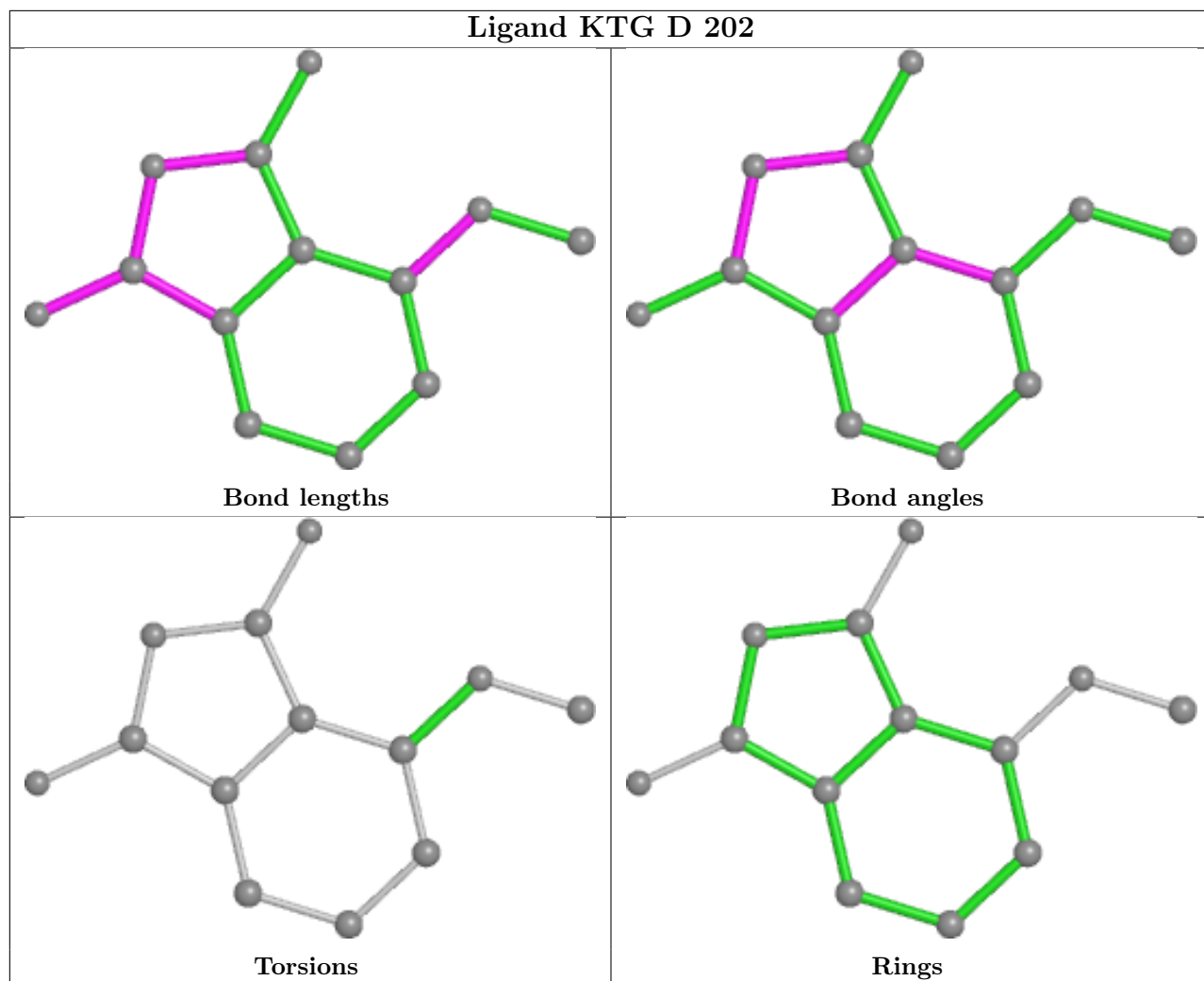


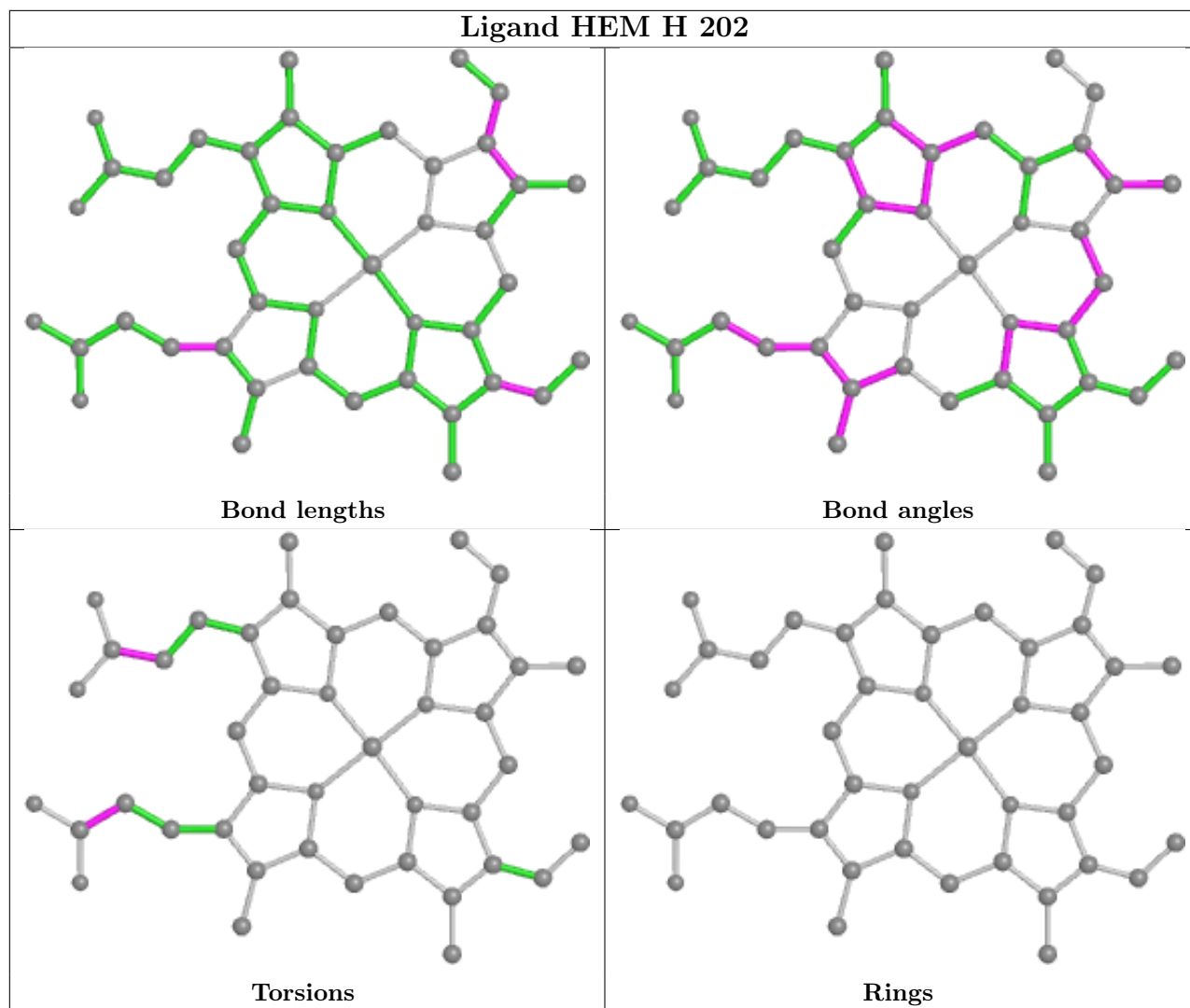


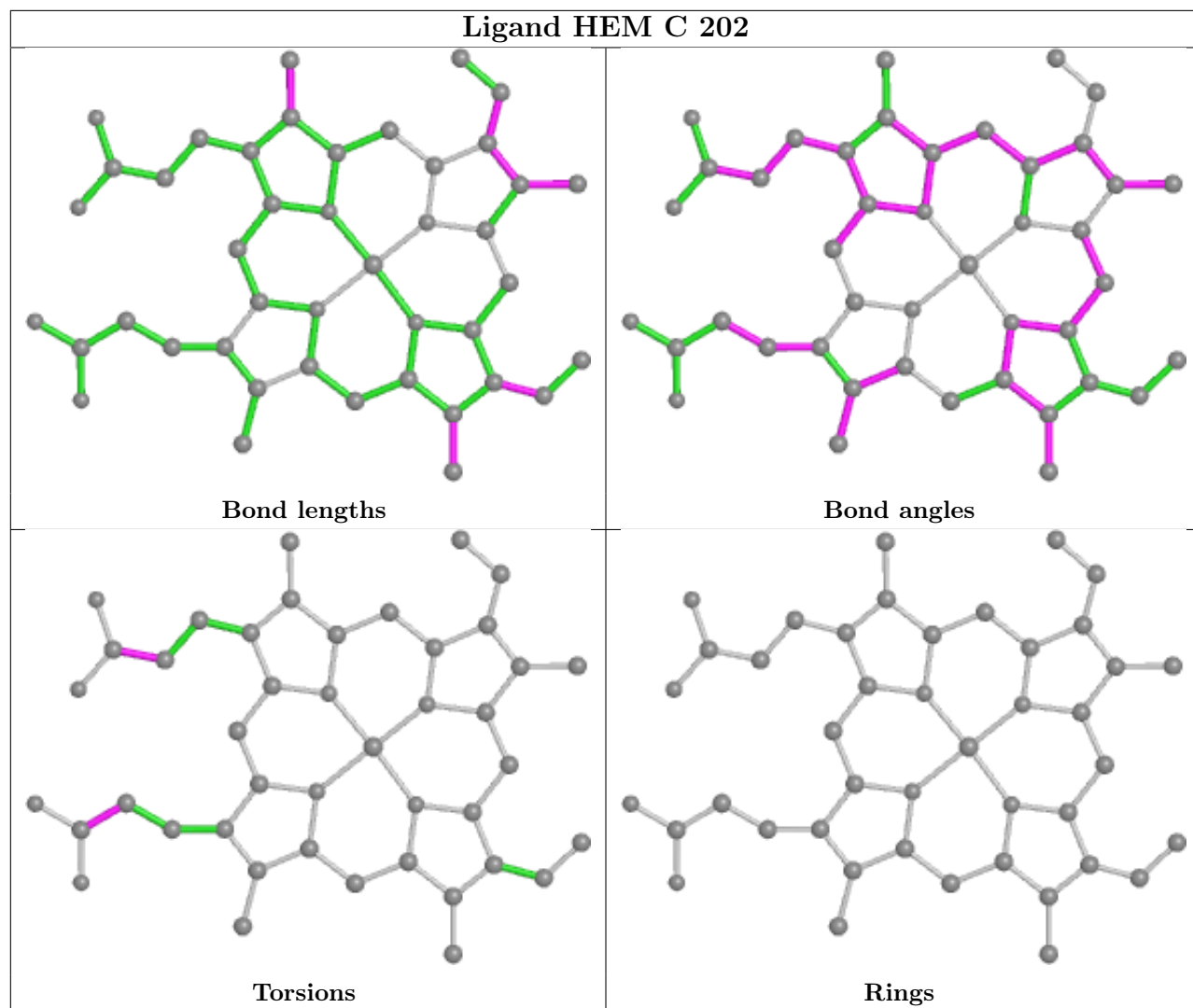


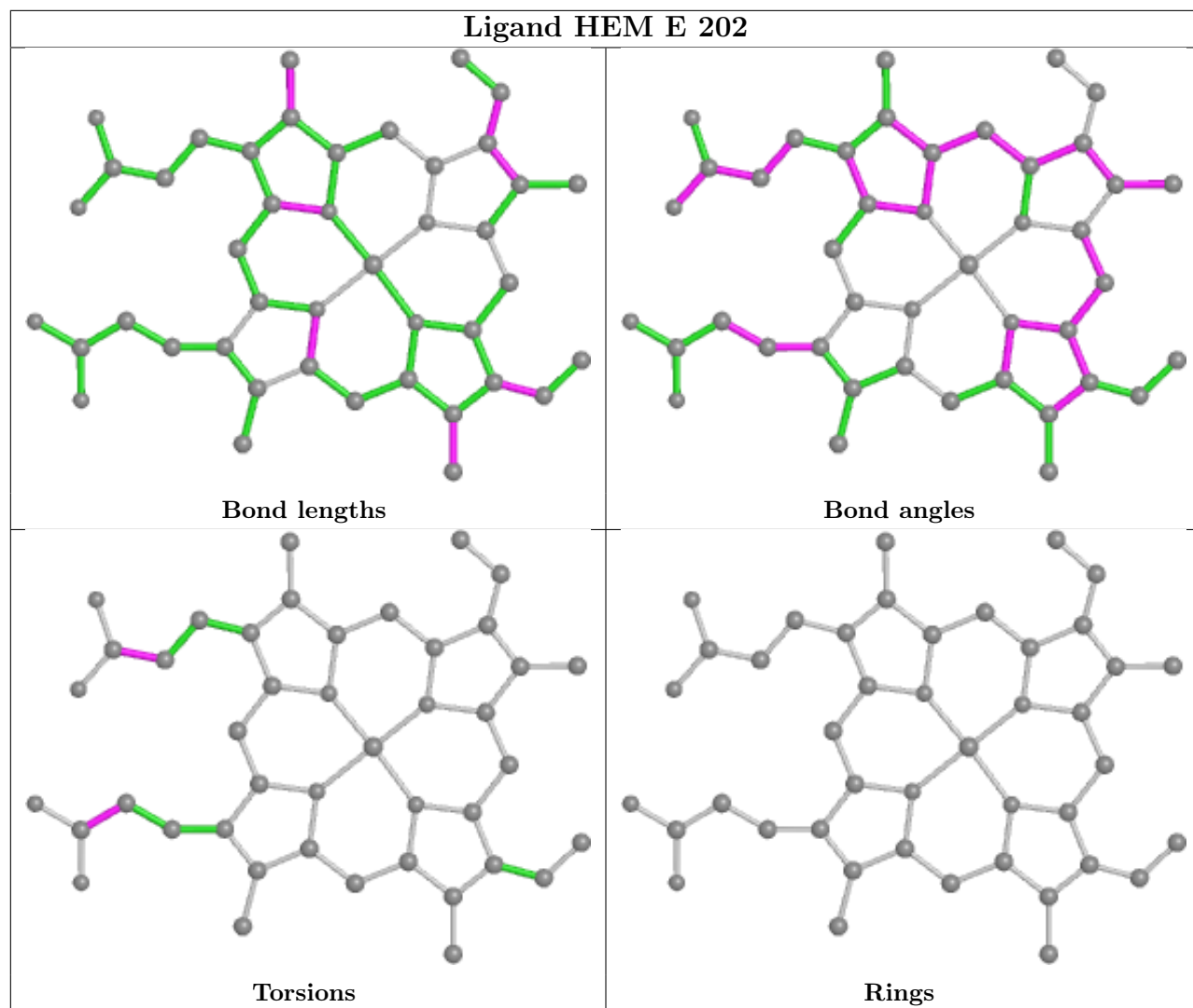


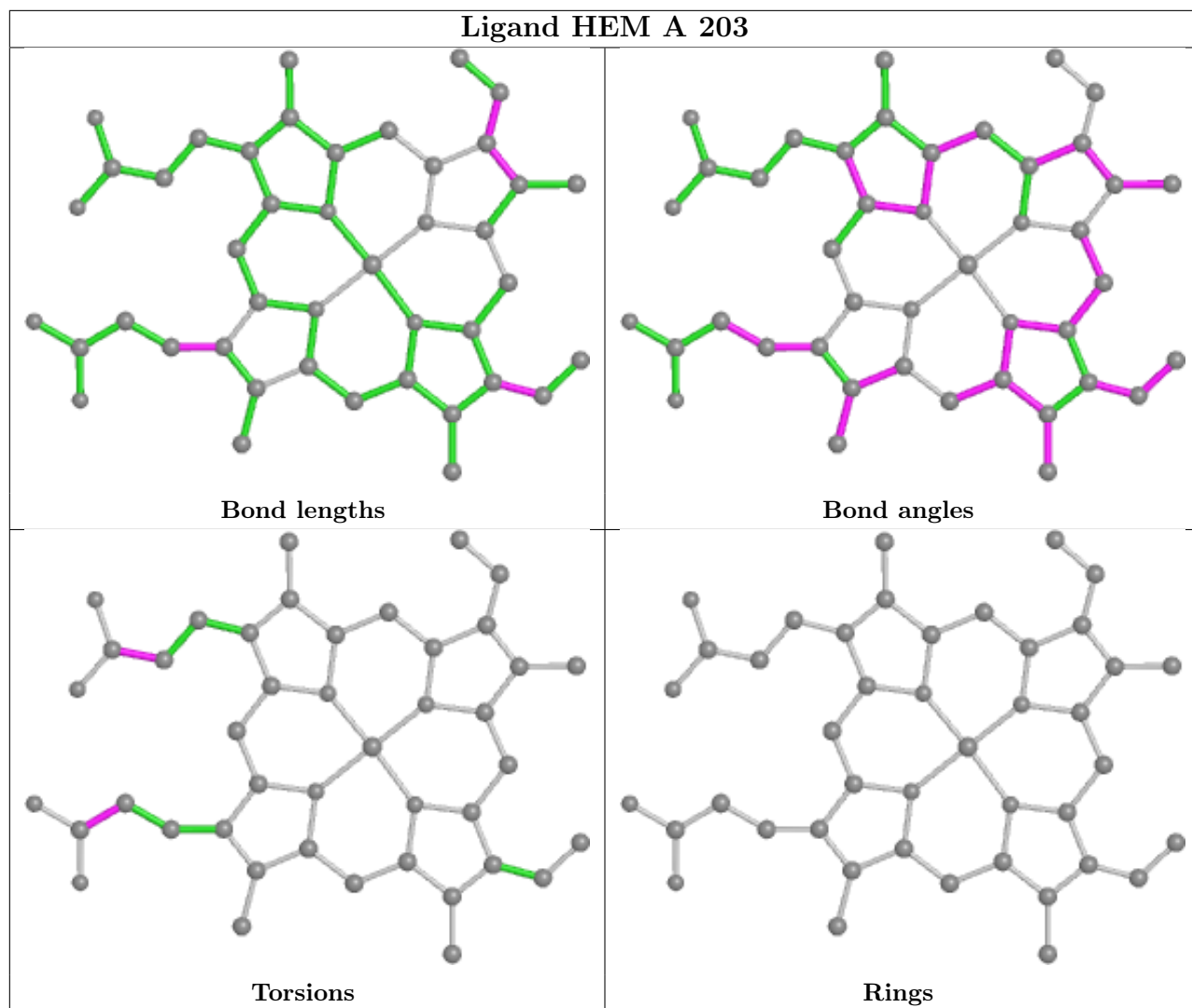


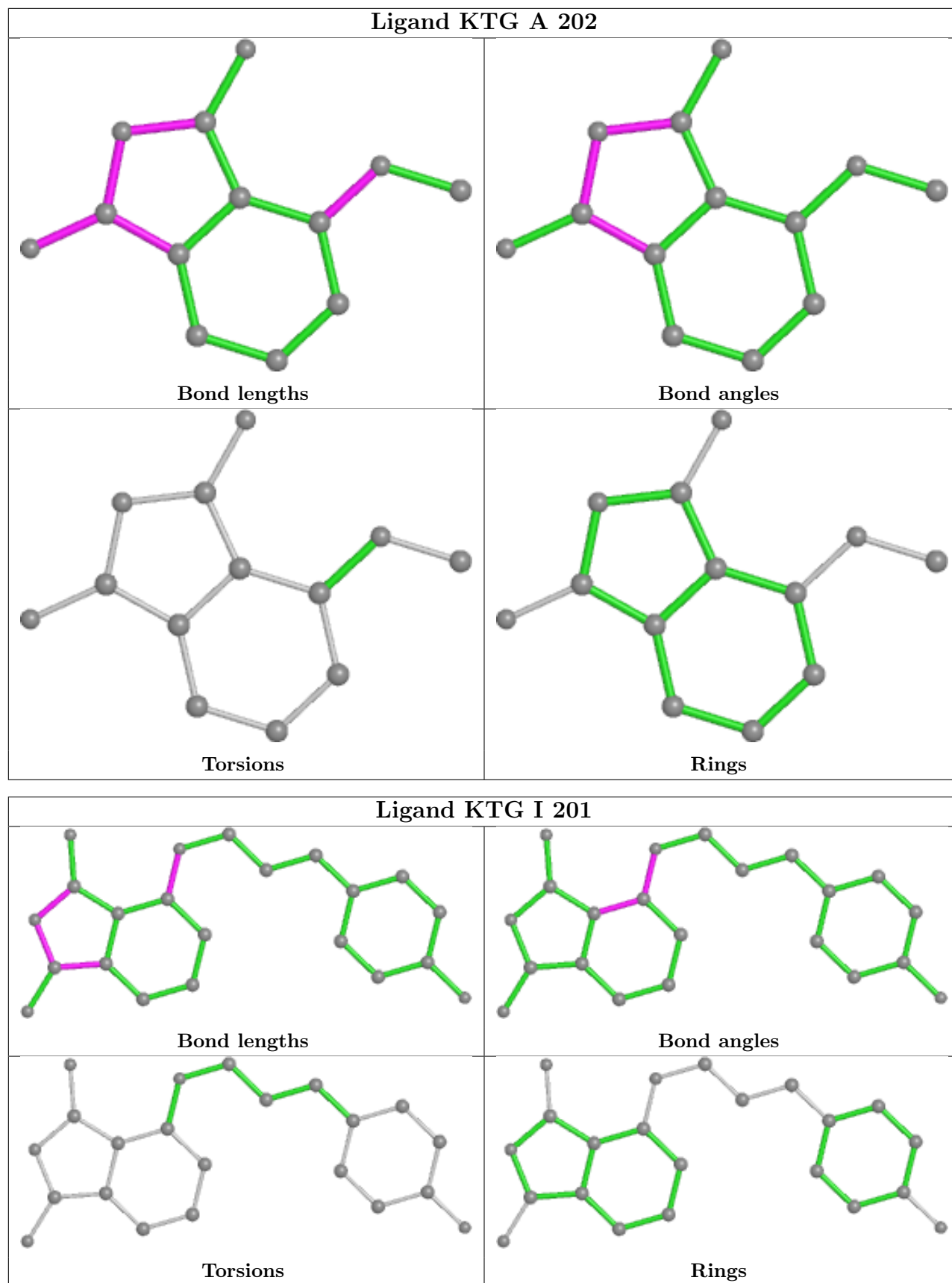


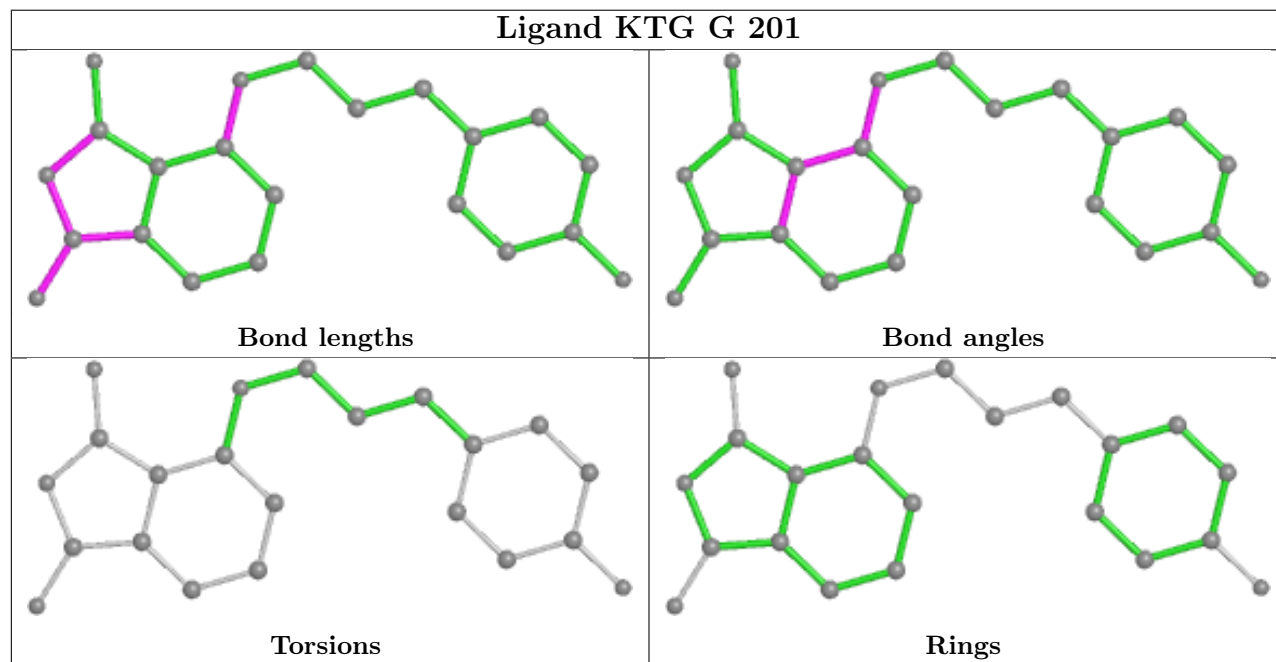
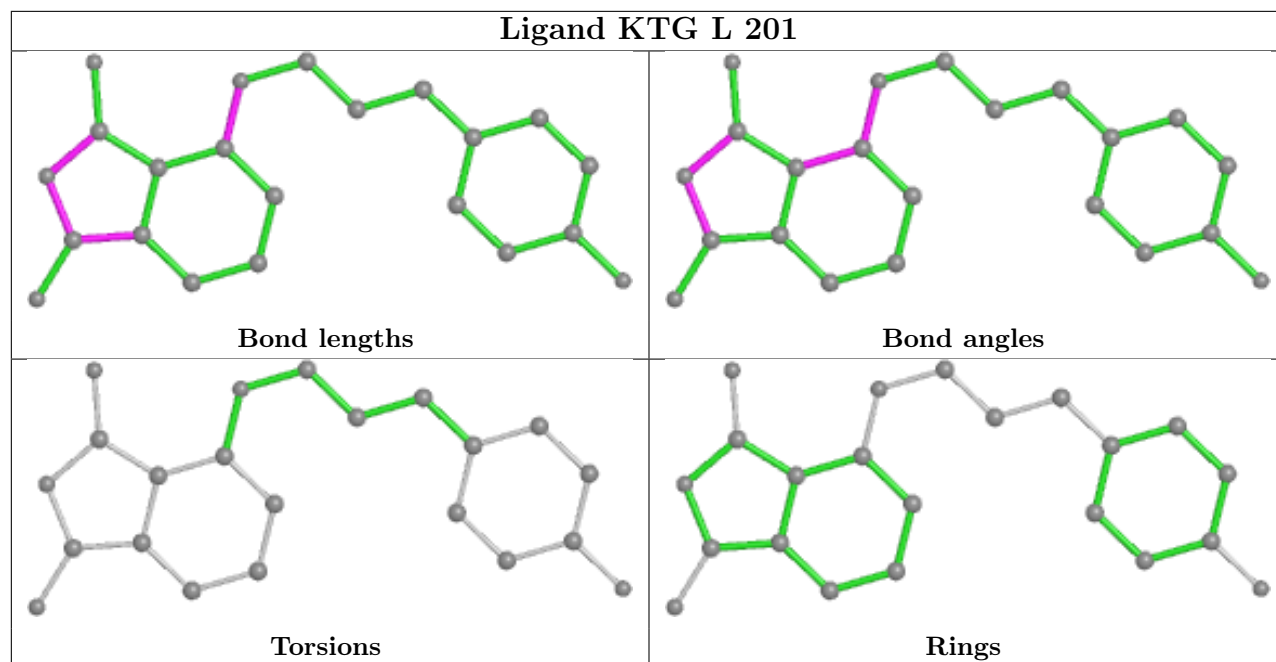


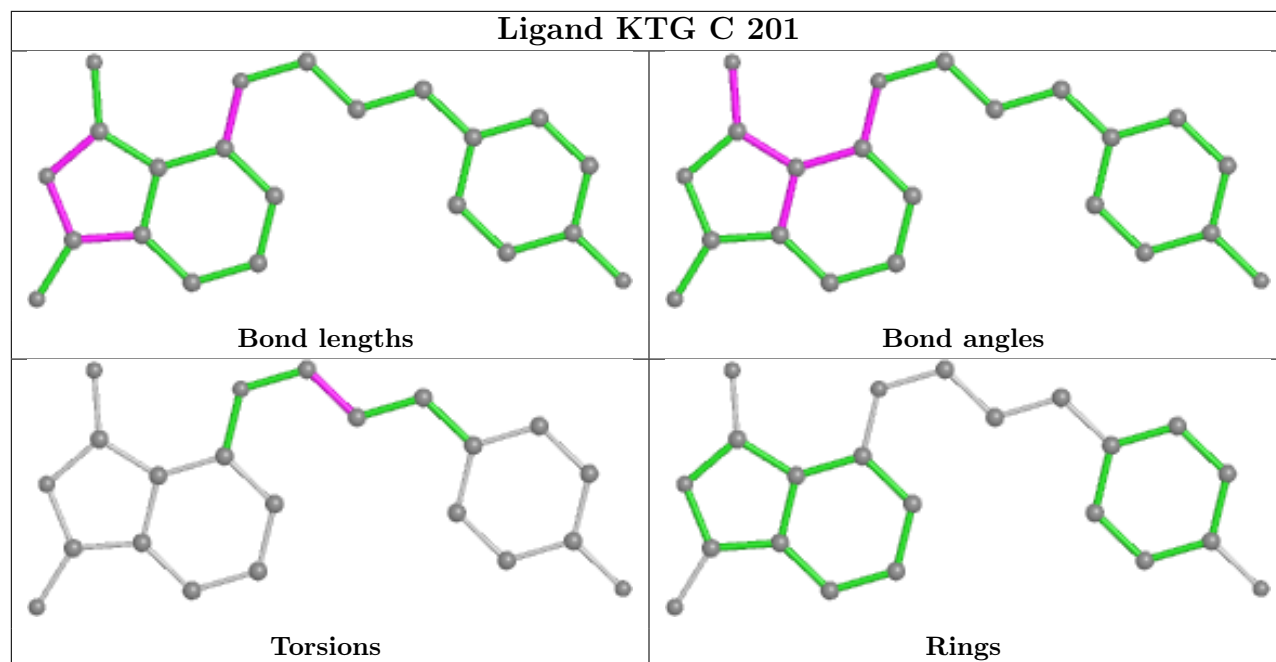












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.



## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	156/158 (98%)	-0.39	0 100 100	17, 23, 35, 48	0
1	B	156/158 (98%)	-0.41	0 100 100	18, 23, 34, 51	0
1	C	156/158 (98%)	-0.42	0 100 100	17, 22, 31, 50	0
1	D	156/158 (98%)	-0.30	0 100 100	22, 27, 38, 54	0
1	E	156/158 (98%)	-0.43	0 100 100	17, 20, 29, 47	0
1	F	156/158 (98%)	-0.37	0 100 100	17, 23, 31, 51	0
1	G	156/158 (98%)	-0.41	0 100 100	19, 24, 34, 52	0
1	H	156/158 (98%)	-0.25	0 100 100	20, 25, 35, 51	0
1	I	156/158 (98%)	-0.41	0 100 100	19, 24, 34, 51	0
1	J	156/158 (98%)	-0.35	0 100 100	18, 23, 34, 49	0
1	K	156/158 (98%)	-0.42	0 100 100	18, 24, 34, 50	0
1	L	156/158 (98%)	-0.25	0 100 100	19, 26, 39, 54	0
All	All	1872/1896 (98%)	-0.37	0 100 100	17, 24, 34, 54	0

There are no RSRZ outliers to report.

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands i

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

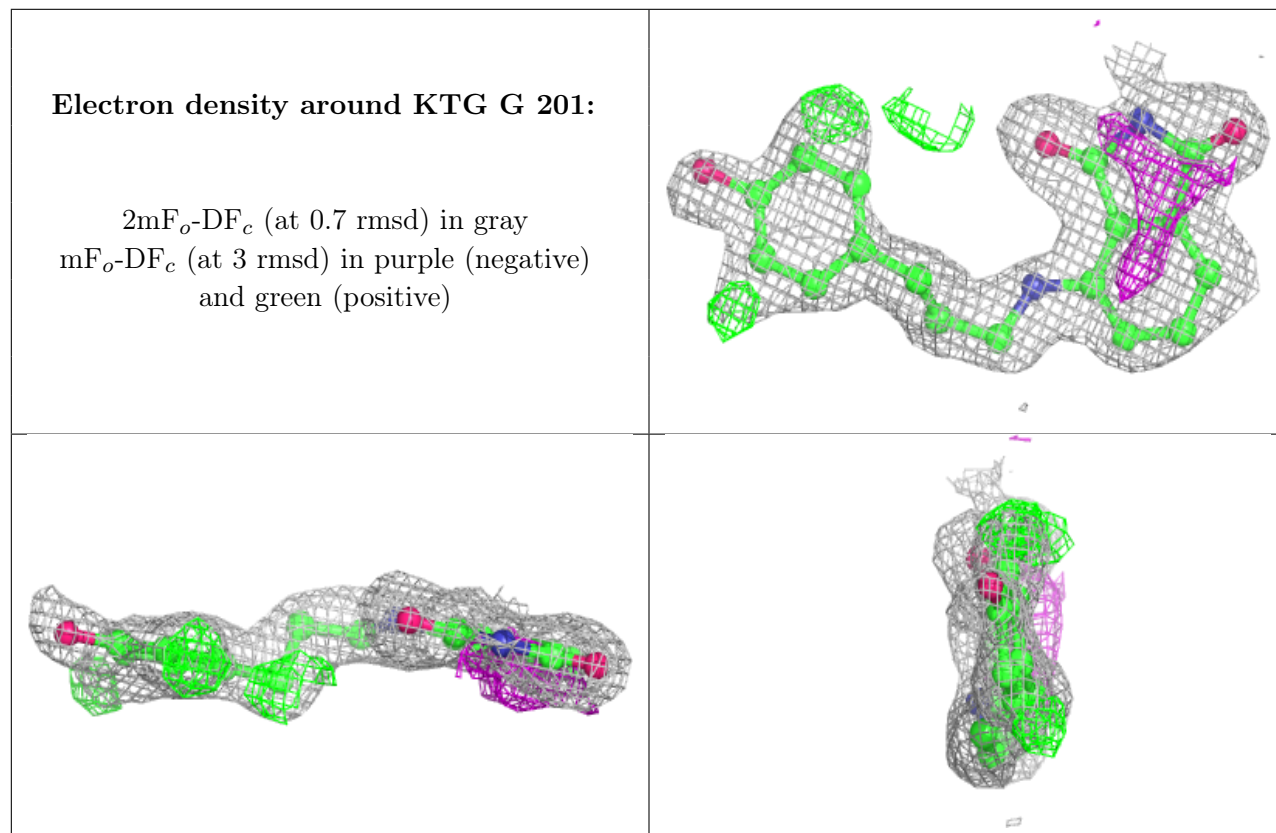
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	KTG	G	201	22/22	0.75	0.25	27,43,53,63	0
5	PG4	I	203	8/13	0.75	0.21	40,50,56,60	0
3	KTG	I	201	22/22	0.77	0.26	31,41,56,70	0
5	PG4	A	204	13/13	0.78	0.19	29,42,50,59	0
3	KTG	K	201	22/22	0.78	0.23	36,45,60,70	0
5	PG4	G	202	13/13	0.79	0.19	31,42,49,59	0
3	KTG	C	201	22/22	0.79	0.23	30,46,59,68	0
5	PG4	H	204	8/13	0.80	0.21	44,50,55,60	0
5	PG4	E	204	8/13	0.81	0.22	39,46,53,53	0
3	KTG	H	201	15/22	0.81	0.22	28,36,44,46	0
3	KTG	E	201	22/22	0.81	0.25	27,40,55,63	0
5	PG4	D	205	10/13	0.81	0.18	45,47,55,60	0
5	PG4	D	204	13/13	0.82	0.18	30,41,58,58	0
3	KTG	F	201	22/22	0.83	0.23	28,41,55,65	0
3	KTG	B	202	22/22	0.83	0.21	27,37,55,64	0
5	PG4	C	204	10/13	0.84	0.19	31,38,50,50	0
5	PG4	C	203	11/13	0.85	0.15	31,41,53,56	0
5	PG4	A	205	13/13	0.86	0.15	33,41,48,53	0
5	PG4	H	203	13/13	0.86	0.15	31,44,50,57	0
5	PG4	K	202	13/13	0.86	0.17	30,39,51,53	0
5	PG4	J	202	13/13	0.87	0.15	26,37,49,51	0
5	PG4	E	203	13/13	0.88	0.14	29,36,47,52	0
3	KTG	J	201	22/22	0.88	0.18	29,39,49,56	0
3	KTG	L	201	22/22	0.89	0.16	30,40,55,56	0
5	PG4	L	203	13/13	0.89	0.13	24,40,45,46	0
5	PG4	I	202	13/13	0.90	0.13	29,44,49,51	0
3	KTG	A	202	13/22	0.92	0.17	26,31,42,46	0
3	KTG	D	202	13/22	0.93	0.14	29,35,44,46	0
4	HEM	L	202	43/43	0.93	0.14	21,25,30,35	43
5	PG4	J	203	13/13	0.95	0.09	26,33,38,44	0
4	HEM	H	202	43/43	0.95	0.11	19,23,38,44	0
4	HEM	F	202	43/43	0.95	0.12	17,22,37,39	0
4	HEM	E	202	43/43	0.96	0.11	16,21,37,39	0
4	HEM	C	202	43/43	0.96	0.12	18,24,36,41	0
4	HEM	D	203	43/43	0.96	0.11	21,25,33,34	43
4	HEM	A	203	43/43	0.97	0.10	18,23,37,39	0
2	FE2	B	201	1/1	0.99	0.07	19,19,19,19	0

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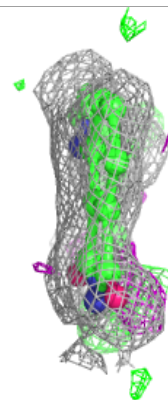
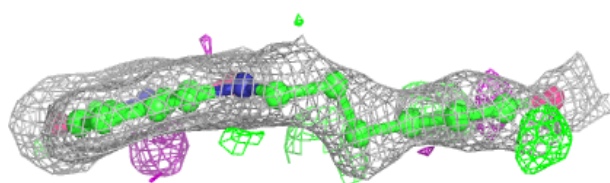
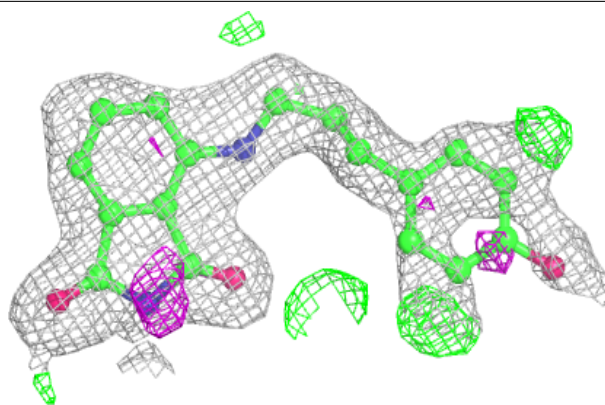
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	FE2	D	201	1/1	0.99	0.08	22,22,22,22	0
2	FE2	A	201	1/1	1.00	0.07	17,17,17,17	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

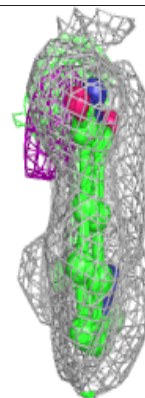
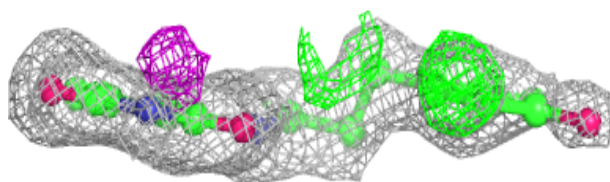
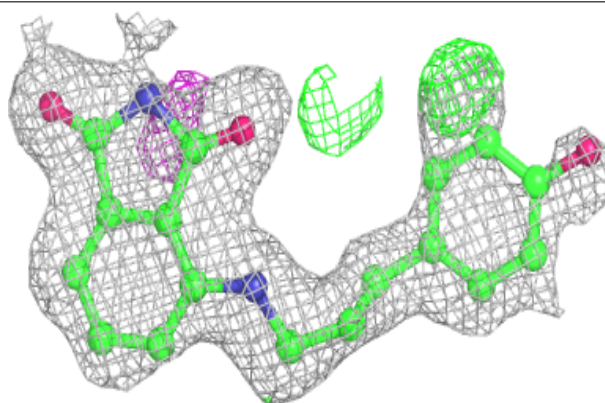


**Electron density around KTG I 201:**

$2mF_o-DF_c$  (at 0.7 rnsd) in gray  
 $mF_o-DF_c$  (at 3 rnsd) in purple (negative)  
and green (positive)

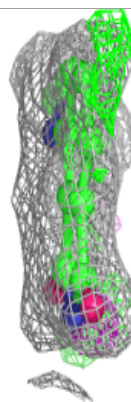
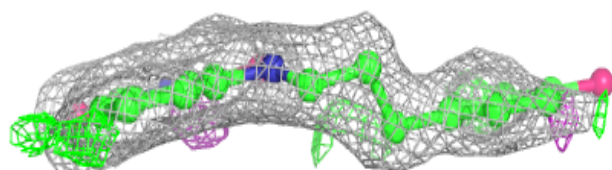
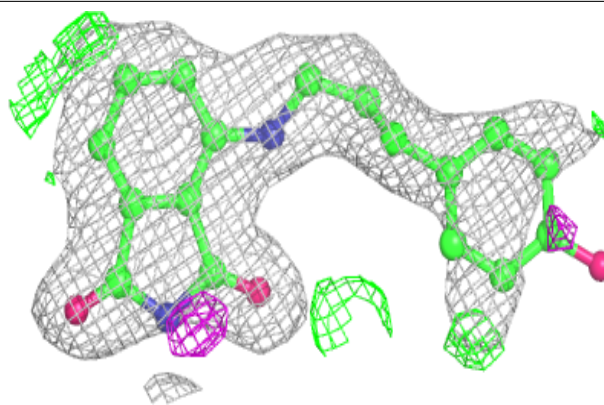
**Electron density around KTG K 201:**

$2mF_o-DF_c$  (at 0.7 rnsd) in gray  
 $mF_o-DF_c$  (at 3 rnsd) in purple (negative)  
and green (positive)

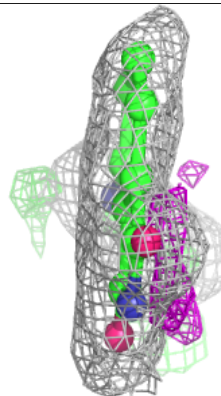
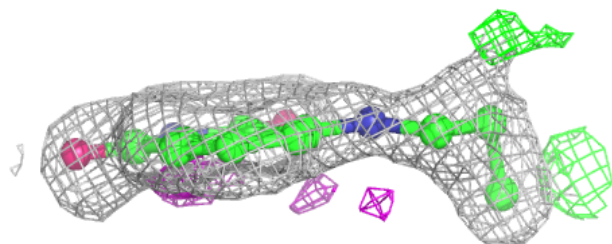
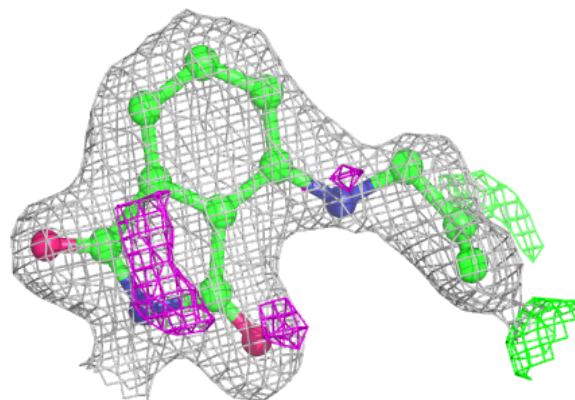


**Electron density around KTG C 201:**

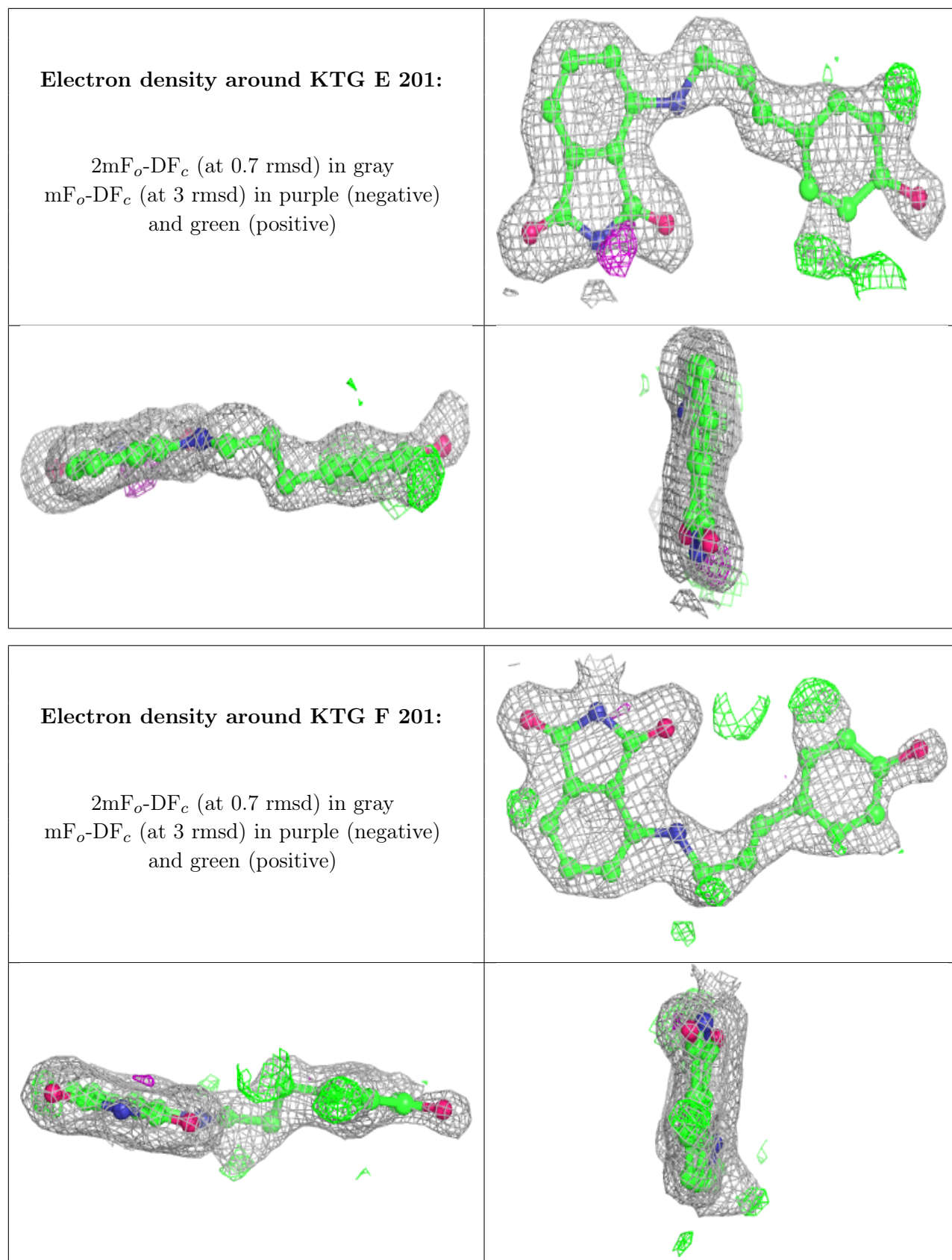
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around KTG H 201:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

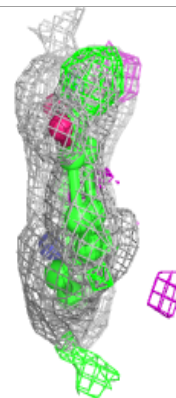
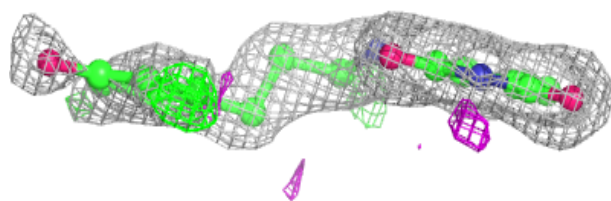
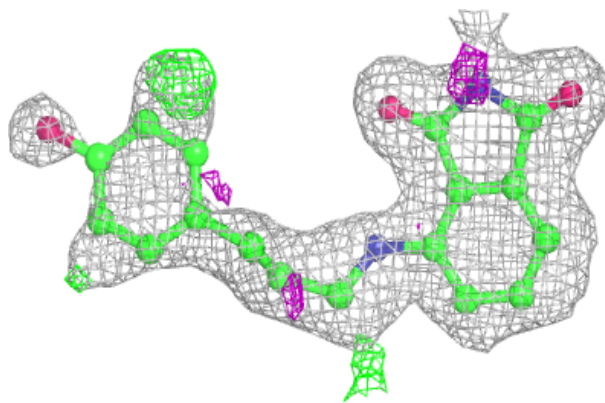




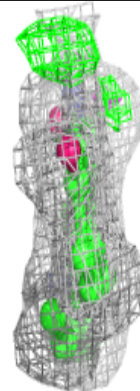
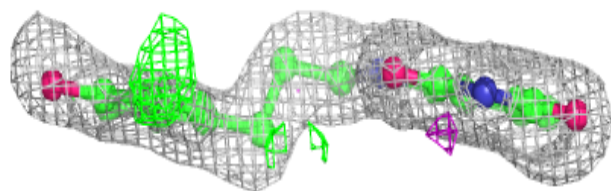
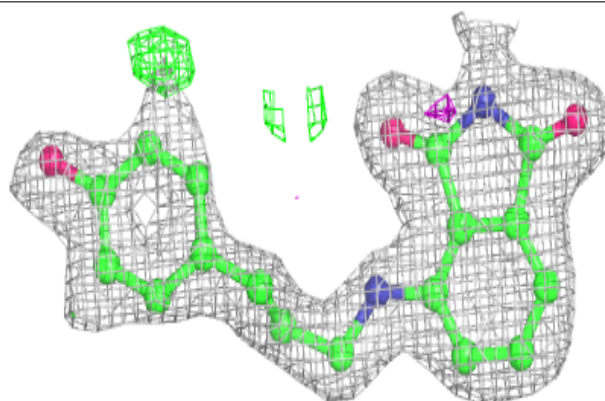


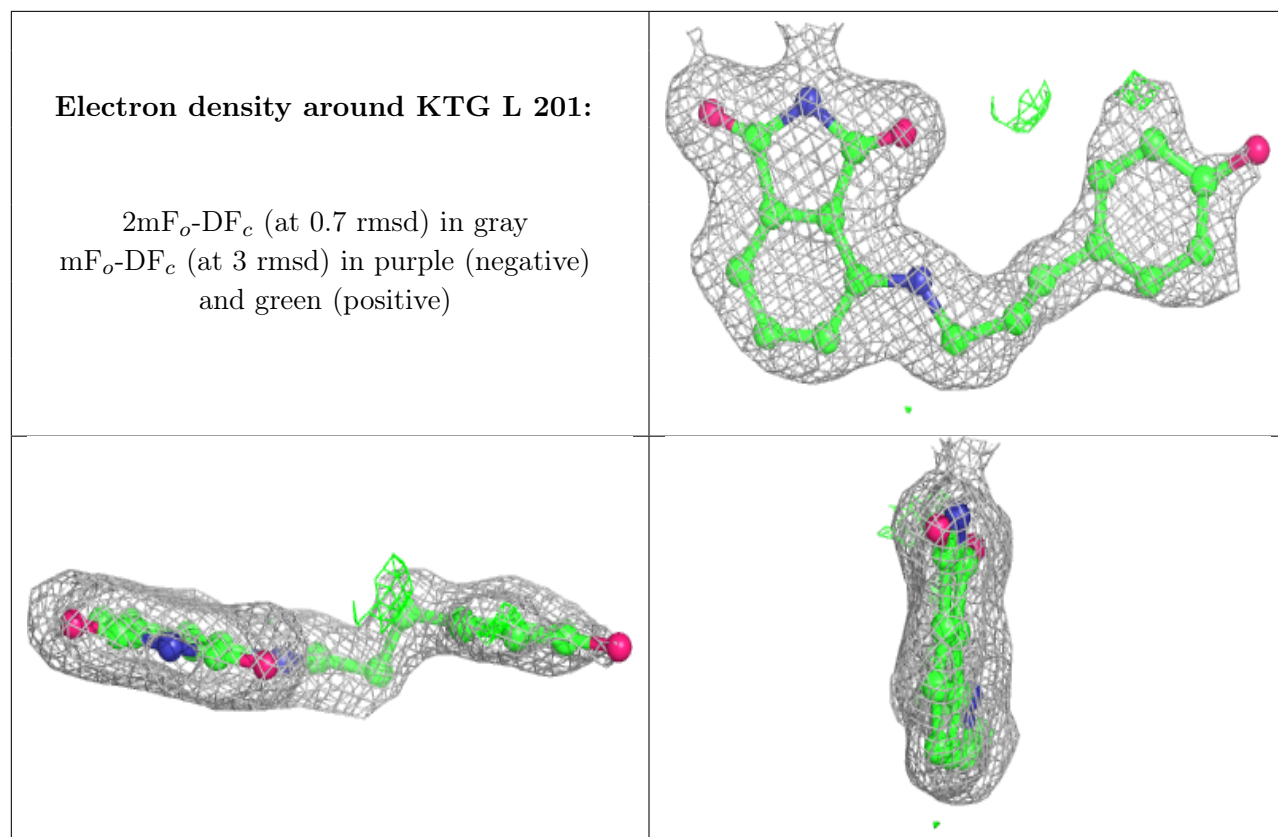
**Electron density around KTG B 202:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around KTG J 201:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

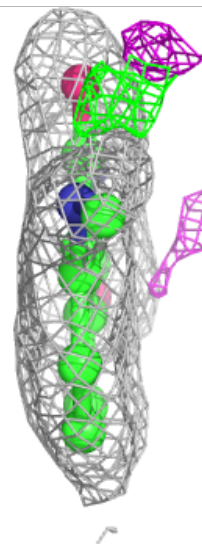
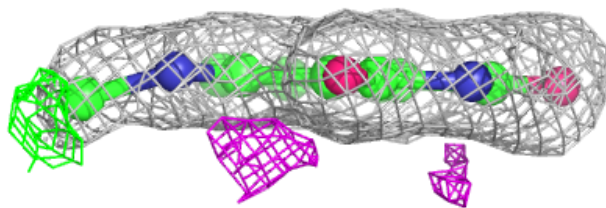
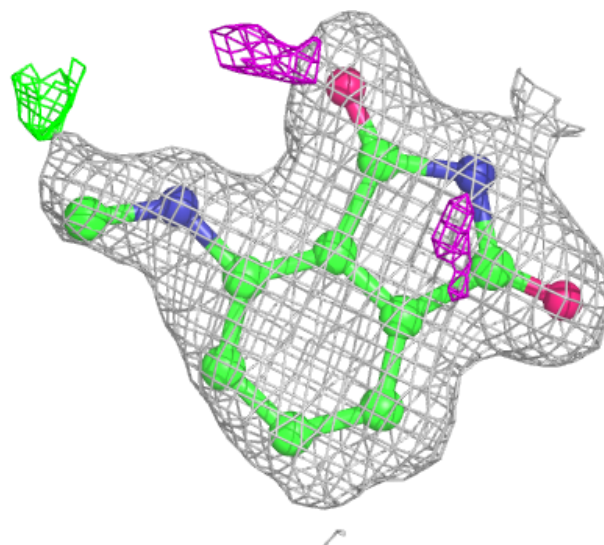






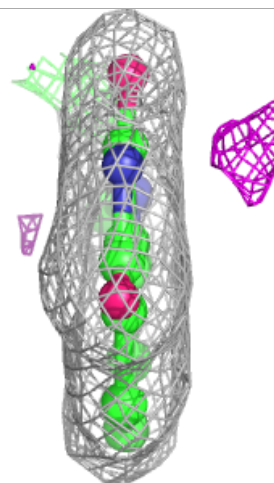
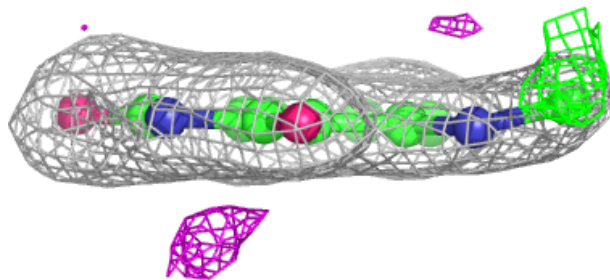
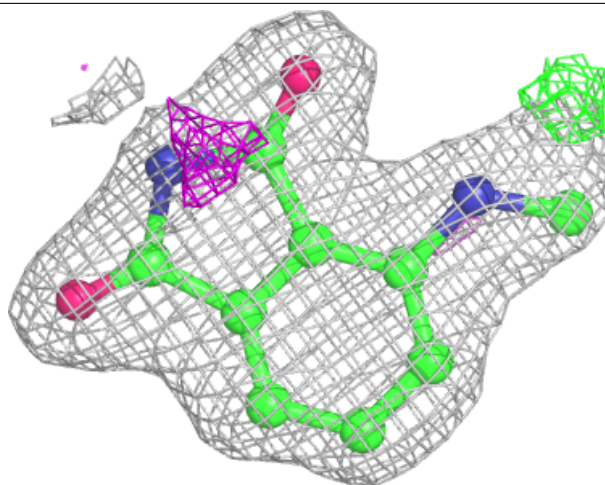
**Electron density around KTG A 202:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



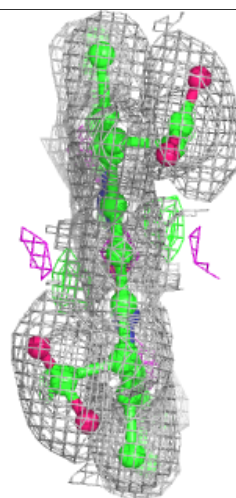
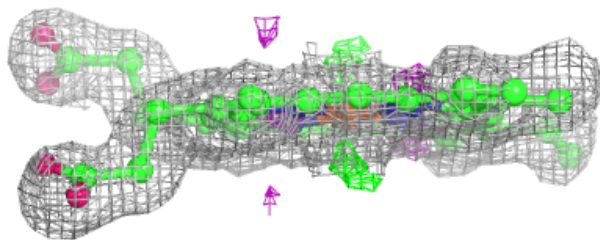
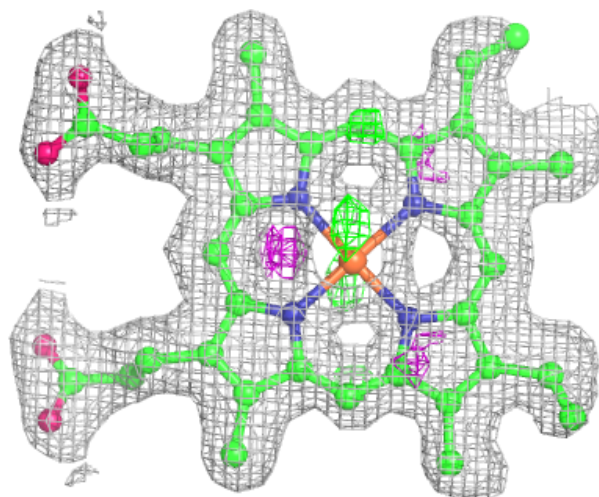
**Electron density around KTG D 202:**

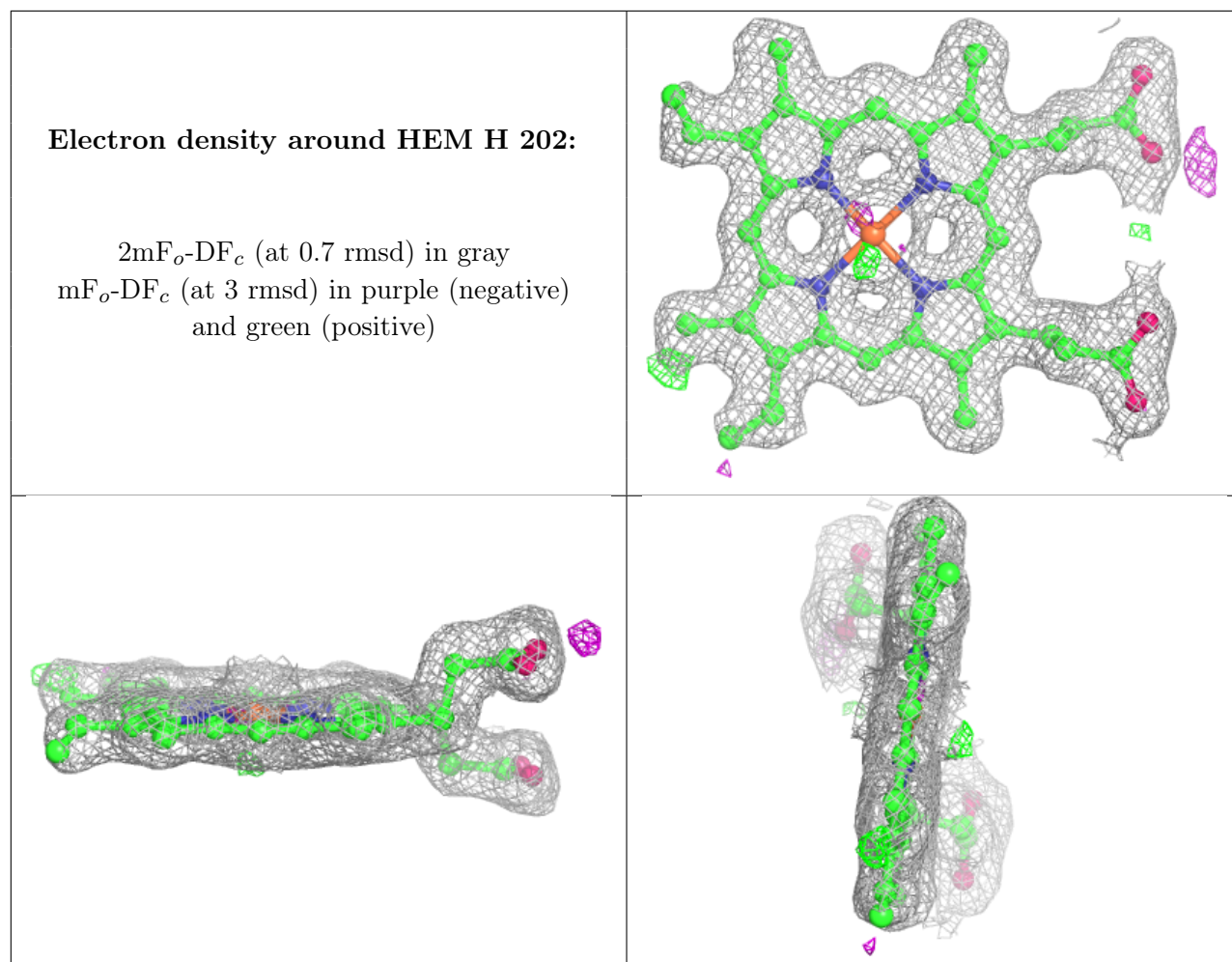
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM L 202:**

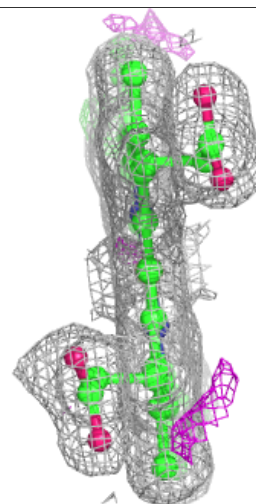
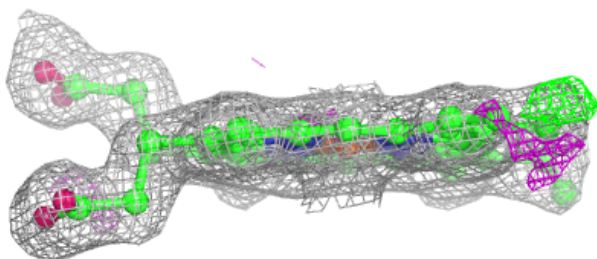
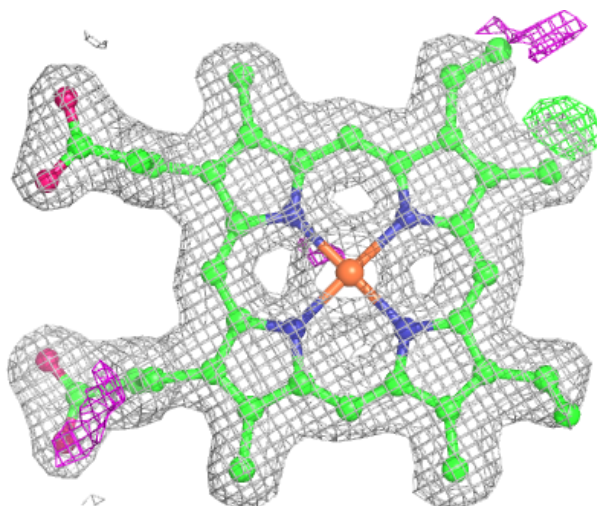
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around HEM F 202:**

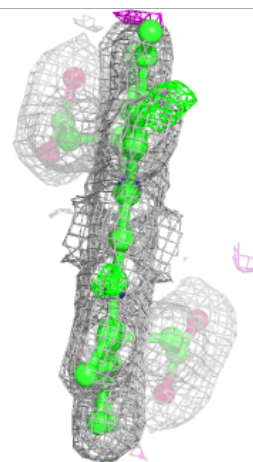
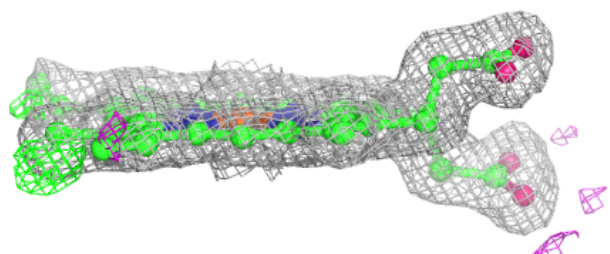
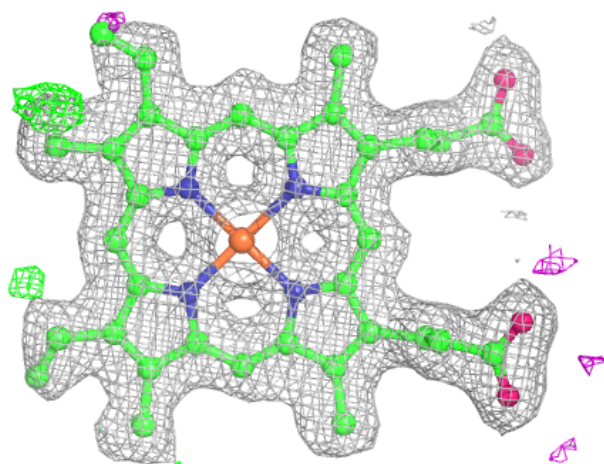
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





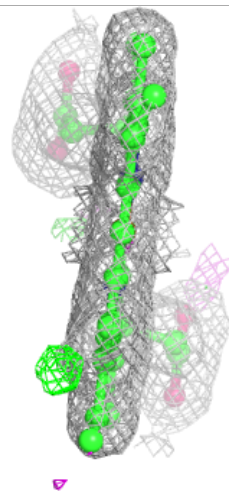
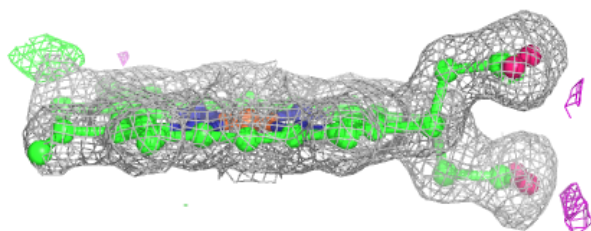
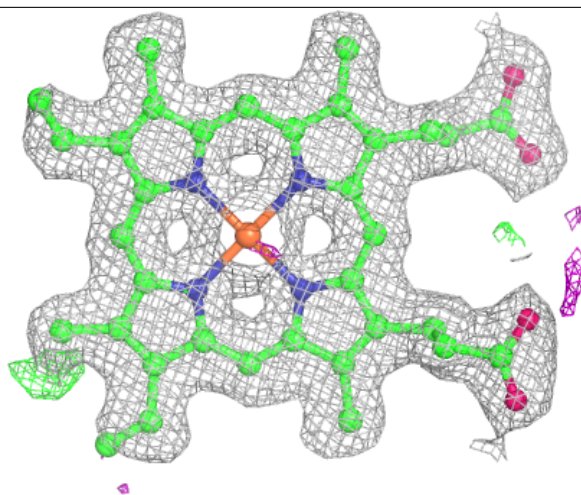
**Electron density around HEM E 202:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



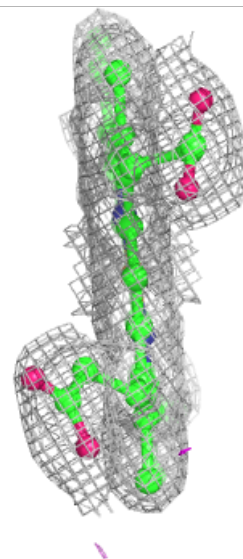
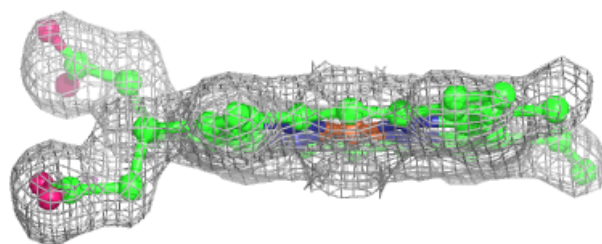
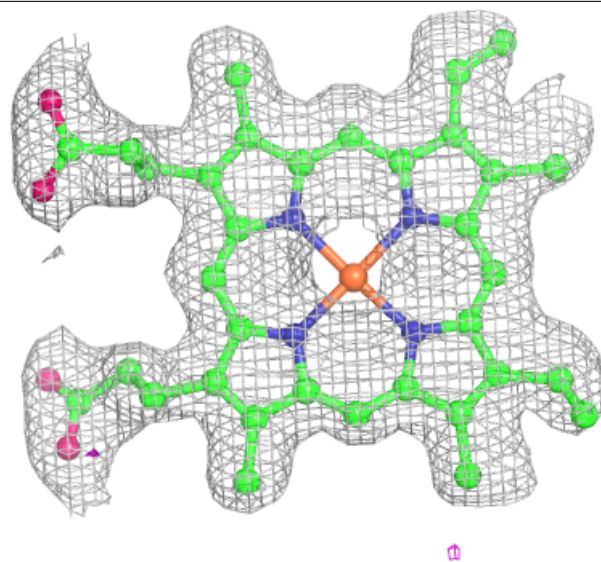
**Electron density around HEM C 202:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

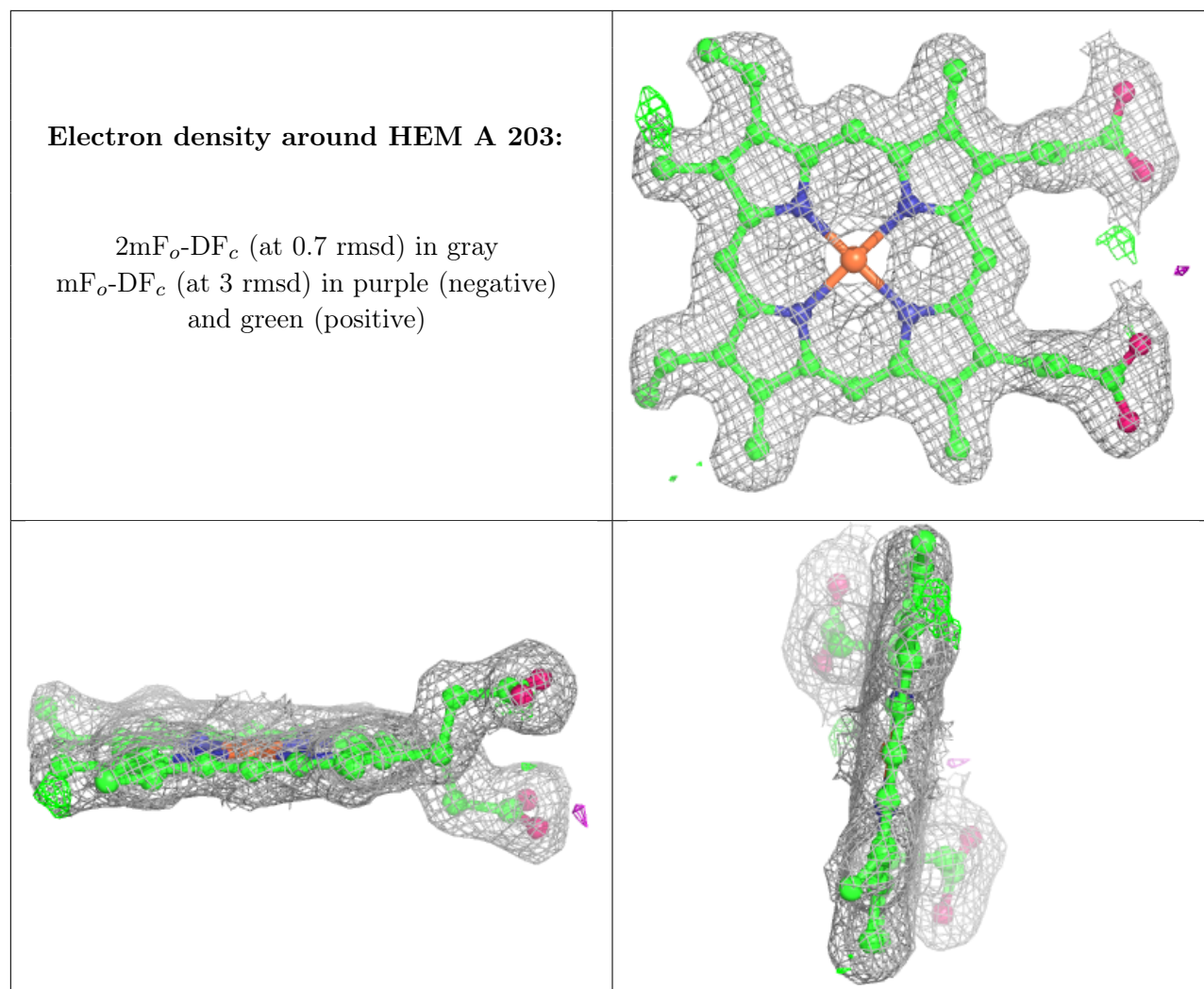


**Electron density around HEM D 203:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)







## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.